8.0 Environmental Information

8.1 Air Quality

This section discusses issues related to potential air quality impacts resulting from the EAEC project. Section 8.1.1 presents the air quality setting, including geography, topography, climate, and meteorology. Section 8.1.2 discusses existing air quality at the proposed project site and provides an overview of standards and health effects. Section 8.1.3 discusses the criteria pollutants and air quality trends in the project vicinity. The affected environment is analyzed in Section 8.1.4, and air quality regulatory agencies relevant to the project are identified; the LORS that can affect the project and project conformance are also identified in Section 8.1.4. Section 8.1.5 discusses the environmental consequences of emissions from the project facility and presents an overview of approaches for estimating facility impacts, modeling, and analysis. The screening health risk assessment, visibility screening analysis, and construction impacts analysis also are discussed. Section 8.1.6 discusses compliance with LORS applicable to the project. An analysis of cumulative impacts is presented in Section 8.1.7. Nitrate deposition impacts are presented in Section 8.1.8. Mitigation for project air quality impacts is discussed in Section 8.1.9. A list of references used in preparing the section is provided in Section 8.1.10.

8.1.1 Air Quality Setting

8.1.1.1 Geography and Topography

The East Altamont Energy Center (EAEC) is located in the far eastern corner of Alameda County. The site lies northeast of the intersection of Mountain House Road and Kelso Road. The UTM coordinates of the site are 4185 kilometers northing, 625 kilometers easting. The nominal site elevation is 40 feet above mean sea level.

The project site is located in the San Joaquin Valley, within the boundary of the San Francisco Bay Area Air Basin. The San Joaquin Valley is quite broad and is generally oriented north to south. The area in the immediate vicinity of the project site, which is located at the eastern edge of the Altamont Hills, is relatively flat towards the east, with terrain rising into the Altamont Hills towards the west. The area surrounding the project site can be characterized as rural. Areas within three kilometers of the project site are predominately undeveloped or farmland with small areas of residential development, mostly along secondary roads.

8.1.1.2 Climate and Meteorology

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the topography of the air basin, and the meteorological conditions. In the project area, stable atmospheric conditions and light winds can provide conditions for pollutants to accumulate in the air basin. The predominant winds in California are shown in Figures 8.1-1 through 8.1-4. As the figures indicate, winds in California generally are light and easterly in the winter, but strong and westerly in the spring, summer, and fall. Figures 8.1-5 and 8.1-6 show more detailed data on the surface windflow regimes for the east bay area and the adjacent San Joaquin valley area.[1] Statistical data for these figures is given in Tables 8.1-1 and 8.1-2.

[1] California Surface Wind Climatology, CARB-ADD, Meteorological Section, T.P. Hayes, et. al., June 1984.

TABLE 8.1-1
San Francisco Bay Area Air Basin Surface Airflow Types: Seasonal And Diurnal Percentage Of Occurrence (1977-1981 Data)

	Types							
Time - PST	Ib North-westerly (Weak)	Ia North-Westerly (Moderate to Strong)	II Southerly	III South easterly	IV North-easterly	V Bay Inflow	VI Bay Out-Flow	VII Calm
Winter								
4 a.m.	3	4	19	14	8	21	5	24
10 a.m.	4	5	19	20	10	11	19	9
4 p.m.	16	16	16	12	13	3	22	1
10 p.m.	6	9	14	14	10	20	3	21
All Times	7	9	17	15	10	14	12	14
Spring								
4 a.m.	27	25	11	2	4	15	5	12
10 a.m.	29	25	14	6	5	3	17	1
4 p.m.	22	60	7	4	4	2	2	*
10 p.m.	40	34	8	2	4	5	3	5
All Times	29	36	10	3	4	6	7	5
Summer								
4 a.m.	40	37	4	*	0	6	2	10
10 a.m.	37	44	4	*	1	1	13	0
4 p.m.	20	77	2	0	1	0	*	0
10 p.m.	39	55	2	0	*	1	1	1
All Times	34	53	3	0	1	2	4	3
Fall								
4 a.m.	25	13	7	6	3	22	3	19
10 a.m.	28	15	6	11	6	7	23	4
4 p.m.	31	46	5	2	6	2	2	*
10 p.m.	37	24	6	4	3	13	13	12
All Times	30	24	6	6	4	11	11	9
Yearly								
4 a.m.	24	20	10	6	4	16	4	16
10 a.m.	25	22	11	9	6	6	18	4
4 p.m.	22	50	8	5	6	2	7	*
10 p.m.	31	30	8	5	4	10	2	10
All Times	26	30	9	6	5	8	8	8

Note: * < 0.5 percent

TABLE 8.1-2

San Joaquin Valley Air Basin Surface Airflow Types: Seasonal and Diurnal Percentage of Occurrence (1977-1981 Data)

	Types				
Time - PST	I Upvalley	II Downvalley Drainage	III Southerly	IV Northerly (No Marine Air)	V Calm
Winter					
4 a.m.	8	22	22	8	38
10 a.m.	9	18	29	16	29
4 p.m.	22	11	23	22	22
10 p.m.	11	22	22	9	36
All Times	13	18	24	14	31
Spring					
4 a.m.	33	21	6	20	20
10 a.m.	36	10	16	29	10
4 p.m.	50	5	9	32	4
10 p.m.	44	15	7	23	11
All Times	41	13	9	26	11
Summer					
4 a.m.	60	10	2	18	10
10 a.m.	68	4	3	22	3
4 p.m.	75	2	*	23	0
10 p.m.	74	3	*	22	1
All Times	69	5	2	21	3
Fall					
4 a.m.	24	21	7	12	36
10 a.m.	35	10	16	19	20
4 p.m.	54	8	6	25	6
10 p.m.	40	14	9	12	26
All Times	38	13	10	17	22
Yearly					
4 a.m.	31	19	9	15	26
10 a.m.	37	11	16	22	16
4 p.m.	50	7	10	25	8
10 p.m.	42	14	10	12	19
All Times	40	13	11	19	17

Note: * < 0.5 percent

Air flow in the valley can be characterized by up-valley and down-valley winds. The down-valley winds are generally caused by airflows into the Valley from the Carquinez Strait and the Altamont Pass that then flow south. However, the local climate of the project area is modified by the Altamont Hills. Strong diurnal wind regimes markedly affect the horizontal transport of air in the project area. This results in a pronounced west-west-southwest component to the wind rose, which is presented on Figures 8.1-7a through 7g. This wind rose is from an existing air quality monitoring station (which collects hourly wind speed, wind direction, and temperature data) located northwest of the town of Tracy and operated by the San Joaquin Valley Unified Air Pollution Control District. The annual wind rose

shows a consistent high-speed wind pattern (58 percent of wind speeds are greater than 3.7 m/s), with predominant wind direction of west-southwest and a secondary maximum at west. Analysis of a stability rose of this station demonstrates that D stability occurs up to 38 percent of the time, with the predominance of D Stability primarily due to the large frequency of high wind-speeds. In general, this flow is indicative of the influence of the Altamont Pass.

A summary of other relevant climatic data (average) for the project area based upon data collected at two meteorological stations near Tracy is presented in Table 8.1-3.

TABLE 8.1-3
Summary of Climatic Data (Average) for Project Area from Nearby Stations

	Carbona Station	Pumping Plant Station
County	San Joaquin	Alameda
Elevation	140 feet (AMSL)	61 feet (AMSL)
Latitude	37 degrees, 42 minutes N	37 degrees, 48 minutes N
Longitude	121 degrees, 25 minutes W	121 degrees, 35 minutes W
Annual Maximum Daily Temperature	74.5 °F	
Annual Minimum Daily Temperature	48.3 °F	
Annual Mean Daily Temperature	61.3 °F	
Maximum Temperature $\geq$ 90 °F	78 days (predominantly in June, July, August)	
Maximum Temperature $\leq$ 32 °F	None	
Minimum Temperature $\leq$ 32 °F	19 days (predominantly in December, January, February)	
Minimum Temperature $\leq$ 0 °F	None	
Total Precipitation	11.25 inches per year	
Primary Precipitation Months	November through April	
Total days with Precipitation $\geq$ 0.10 inches	28 days	
Total Snowfall	None	

Source: Weather of U.S. Cities, 5th Edition, R.W. Wood-Editor, Gale Research, Detroit, MI., 1996

NOTE: AMSL = above mean sea level

8.1.2 Existing Air Quality and Overview of Standards and Health Effects

The U.S. Environmental Protection Agency (USEPA) has established national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), 10-micron particulate matter (PM_{10}), 2.5-micron particulate matter ($PM_{2.5}$), and airborne lead for the protection of public health and welfare. In general, if these NAAQS are exceeded in an area more than once a year, the area is considered a "nonattainment area" subject to planning and pollution control requirements that are more stringent than normal requirements.

In addition, the California Air Resources Board (CARB) has established standards for ozone, CO, NO_2, SO_2, sulfates, PM_{10}, airborne lead, hydrogen sulfide, and vinyl chloride at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases. CARB carries out control program oversight activities, while local air pollution control districts have primary responsibility for air quality planning and enforcement.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. Allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposures to a high concentration for a short time (such as one hour), or to a relatively lower average concentration over a longer period (eight hours, 24 hours, or one year). For some pollutants there is more than one air quality standard, reflecting both its short-term and long-term effects. Table 8.1-4 presents the state and national ambient air quality standards for selected pollutants. Many of the California ambient air quality standards are more stringent than the federal standards and have shorter averaging periods.

USEPA's new NAAQS for ozone and fine particulate matter went into effect on September 16, 1997. For ozone, the previous one-hour standard of 0.12 ppm was replaced by an eight-hour average standard at a level of 0.08 ppm. Compliance with this standard is based on the three-year average of the annual fourth-highest daily maximum eight-hour average concentration measured at each monitor within an area.

The NAAQS for particulates were revised in several respects. First, compliance with the current 24-hour PM_{10} standard is now based on the 99th percentile of 24-hour concentrations at each monitor within an area. In addition, two new $PM_{2.5}$ standards were added: a standard of 15 $\mu g/m^3$, based on the three-year average of annual arithmetic means from single or multiple monitors (as available); and a standard of 65 $\mu g/m^3$, based on the three-year average of the 98th percentile of 24-hour average concentrations at each monitor within an area. Implementation of the new ozone and PM_{10} standards has been delayed pending the resolution of litigation surrounding the standards.

8.1.3 Criteria Pollutants and Air Quality Trends

Three ambient air monitoring stations were used to characterize air quality at the project site. These stations were used because of their proximity to the project site and because they record area-wide ambient conditions rather than the localized impacts of any particular facility.[2] All ambient air quality data presented in this section were taken from CARB publications and data sources. Ambient concentrations of NO_2 and ozone are recorded at a monitoring station located at 24371 Patterson Pass Road in Tracy, approximately 7 km south-southeast of the project site. The nearest monitoring station that records ambient concentrations for CO and PM_{10} is located at Old First Street in Livermore, approximately 21 km southwest of the project site. Sulfur dioxide readings are from Fresno, the closest SO_2 monitoring station that has data for the most recent three years.

The Tracy and Fresno monitoring stations are located in the San Joaquin Valley Air Basin; the Livermore station is in the Bay Area Air Quality Management District. Although the project is located within the San Joaquin Valley, the project is technically within the Bay Area Air Basin and therefore is subject to the air quality regulatory jurisdiction of the BAAQMD.

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[2] See Section 8.1.5.1.2 (Preconstruction Monitoring) for a detailed discussion of why the data from these monitoring stations best represents air quality at the project site.

TABLE 8.1-4
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1 hour	0.09 ppm	0.12 ppm
	8 hours[a]	-	0.08 ppm (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8 hours	9.0 ppm	9 ppm
	1 hour	20 ppm	35 ppm
Nitrogen Dioxide	Annual Average	-	0.053 ppm
	1 hour	0.25 ppm	-
Sulfur Dioxide	Annual Average	-	80 $\mu g/m^3$ (0.03 ppm)
	24 hours	0.04 ppm (105 $\mu g/m^3$)	365 $\mu g/m^3$ (0.14 ppm)
	3 hours	-	1300 $\mu g/m^3$ (0.5 ppm)[b]
	1 hour	0.25 ppm	-
Suspended Particulate Matter (10 Micron)	Annual Geometric Mean	30 $\mu g/m^3$	-
	24 hours	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual Arithmetic Mean	-	50 $\mu g/m^3$
Suspended Particulate Matter (2.5 Micron)[a]	Annual Arithmetic Mean	-	15 $\mu g/m^3$ (3-year average)
	24 hours	-	65 $\mu g/m^3$ (3-year average of 98th percentiles)
Sulfates	24 hours	25 $\mu g/m^3$	-
Lead	30 days	1.5 $\mu g/m^3$	-
	Calendar Quarter	-	1.5 $\mu g/m^3$
Hydrogen Sulfide	1 hours	0.03 ppm	-
Vinyl Chloride	24 hours	0.010 ppm	-
Visibility Reducing Particles	8 hour (10am to 6pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.	-

[a]Standard not currently in effect due to litigation.
[b]This is a national secondary standard, which is designed to protect public welfare.
NOTES: ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

8.1.3.1 Ozone

Ozone is generated by a complex series of chemical reactions between precursor organic compounds (POC) and oxides of nitrogen (NO_x) in the presence of ultraviolet radiation. Ambient ozone concentrations follow a seasonal pattern: higher in the summer time and lower in the wintertime. At certain times, the general area can provide ideal conditions for the formation of ozone due to the persistent temperature inversions, clear skies, mountain ranges that trap the air mass, and exhaust emissions from millions of vehicles and stationary sources. Based upon ambient air measurements at stations throughout the area, the Bay Area and San Joaquin Valley Air Basins are classified as nonattainment areas for ozone.

Maximum ozone concentrations at the Tracy station usually are recorded during the summer months. Table 8.1-5 shows the annual maximum hourly ozone levels recorded at the Tracy 24371 Patterson Pass Road monitoring station during the period 1995-1999, as well as the number of days in which the state and federal standards were exceeded.

TABLE 8.1-5
Ozone Levels in Tracy, 24371 Patterson Pass Road Monitoring Station, 1995-1999 (ppm)

Standard	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hour Average	-	-	-	-	-	0.124	0.140	0.119	0.116	0.132
Number of Days Exceeding:										
State Standard (0.09 ppm, 1-hour)	-	-	-	-	-	9	24	5	14	16
Federal Standard (0.12 ppm, 1-hour)	-	-	-	-	-	0	2	0	0	1

Source: California Air Quality Data, Annual Summary, California Air Resources Board

The long-term trends of maximum one-hour ozone readings and violations of the state and federal standard are shown in Figure 8.1-8 for the Patterson Pass Road monitoring station. The data show that, on average, the state ozone air quality standard was exceeded several days each year. Violations of the federal standard were recorded in 1996 and 1999.

8.1.3.2 Nitrogen Dioxide

Nitrogen oxides are primarily generated from the combustion of fuels. Nitrogen oxides include nitric oxide (NO) and NO_2. Because NO converts to NO_2 in the atmosphere over time and NO_2 is the more toxic of the two, nitrogen dioxide is the listed criteria pollutant. The control of NO_2 is important because of its role in the formation of ozone. Based upon regional air quality measurements of NO_2, both the Bay Area and San Joaquin Valley Air Basins are in attainment for NO_2.

Table 8.1-6 shows the maximum one-hour NO_2 levels recorded in Tracy each year from 1995 through 1999, as well as the annual average level for each of those years. During this period there has not been a single violation of either the state one-hour standard or the NAAQS of 0.053 ppm.

TABLE 8.1-6
Nitrogen Dioxide Levels in Tracy, 24371 Patterson Pass Road Monitoring Station, 1995-1999 (ppm)

Standard	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hour Average	-	-	-	-	-	0.068	0.061	0.060	0.079	0.074
Annual Average (NAAQS = 0.053 ppm)	-	-	-	-	-	-	0.013	0.012	0.013	0.015
Number of Days Exceeding:										
State Standard (0.25 ppm, 1-hour)	-	-	-	-	-	0	0	0	0	0
Federal Standard (0.053 ppm, annual arithmetic mean)	-	-	-	-	-	-	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

Figure 8.1-9 shows the trend from 1995 through 1999 of maximum one-hour NO_2 levels at Tracy. The NO_2 levels are less than one-third of the state standard. Figure 8.1-10 shows the trend from 1996 through 1999 of the annual average NO_2 concentrations.

8.1.3.3 Carbon Monoxide

CO is a product of inefficient combustion, principally from automobiles and other mobile sources of pollution. In many areas of California, CO emissions from wood-burning stoves and fireplaces can also be measurable contributors to ambient CO levels. Industrial sources typically contribute less than 10 percent of ambient CO levels. Peak CO levels occur typically during winter months, due to a combination of higher emission rates and calm weather conditions with strong, ground-based inversions. Based upon ambient air quality monitoring, both the Bay Area and San Joaquin Valley Air Basins are classified as being in attainment for CO.

Table 8.1-7 shows the California and federal air quality standards for CO, and the maximum eight-hour average levels recorded at the Old First Street monitoring station in Livermore during the period 1990-1999. Chapter 14,

TABLE 8.1-7
Carbon Monoxide Levels in Livermore (Old First Street), 1990-1999 (ppm)

Standard	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 8-hour average	4.50	4.75	4.25	4.00	3.41	2.34	2.54	2.53	2.36	5.20
Number of days exceeding:										
State Standard (9.0 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0
Federal Standard (9.3 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

Trends of maximum eight-hour average CO are shown in Figure 8.1-11, which shows that maximum ambient CO levels at Livermore have been below the state standards for many years.

8.1.3.4 Sulfur Dioxide

SO_2 is produced when any sulfur-containing fuel is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains negligible sulfur, while fuel oils contain larger amounts. Peak concentrations of SO_2 occur at different times of the year in different parts of California, depending on local fuel characteristics, weather, and topography. Both the Bay Area and San Joaquin Valley Air Basins are considered to be in attainment for SO_2 for purposes of state and federal air quality planning.

Table 8.1-8 presents the state air quality standard for SO_2 and the maximum levels recorded from 1990 through 1997 in Fresno, the site of the nearest SO_2 monitor with the most recent SO_2 monitoring data. The federal 24-hour average standard is 0.14 ppm; during the period shown, the average SO_2 levels at Fresno have been approximately less than one-tenth of the federal standard. Figure 8.1-12 shows that for several years the maximum 24-hour SO_2 levels typically have been approximately less than one-third of the state standard.

TABLE 8.1-8
Sulfur Dioxide Levels in Fresno (1st Street), 1990-1997 (ppm)

Standard	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 24-Hour Average	0.016	0.013	0.010	0.010	0.011	0.010	0.009	0.003	-	-
Annual Average	0.003	0.004	0.002	0.002	0.004	0.004	0.002	0.000	-	-
Number of Days Exceeding:										
State Standard (0.04 ppm, 24-hr)	0	0	0	0	0	0	0	0	-	-
Federal Standard (0.14 ppm, 24-hr)	0	0	0	0	0	0	0	0		

Source: California Air Quality Data, Annual Summary, California Air Resources Board

8.1.3.5 Respirable Particulate Matter (PM_{10})

Particulates in the air are caused by a combination of wind-blown fugitive dust; particles emitted from combustion sources and manufacturing processes; and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and nitrogen oxides. In 1984, CARB adopted standards for PM_{10} and phased out the total suspended particulate (TSP) standards that had been in effect previously. PM_{10} standards were substituted for TSP standards because PM_{10} corresponds to the size range of particulates that can be inhaled into the lungs and therefore is a better measure to use in assessing potential health effects. In 1987, USEPA also replaced national TSP standards with PM_{10} standards. PM_{10} levels in the San Joaquin Valley Air Basin are in nonattainment with both the federal and state standards. However, for air quality regulatory and permitting purposes, the project is within the Bay Area Air Basin, under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The San Francisco Bay Area Air Basin is in attainment of the federal PM_{10} standards but exceeds the state standards.

As discussed previously, the NAAQS for particulates were further revised by USEPA with new standards that went into effect on September 16, 1997; two new $PM_{2.5}$ standards were added at that time. $PM_{2.5}$ data are available from Stockton, and are presented below.

Table 8.1-9 shows the federal and state air quality standards for PM_{10}, maximum levels recorded at the Old First Street monitoring station in Livermore during 1990-1999, and geometric and arithmetic annual averages for the same period. The maximum 24-hour PM_{10} levels exceed the state standard, and the federal standard has not been exceeded since 1991. The annual average PM_{10} levels have remained below the state and federal standards throughout the 10-year period.

The trend of maximum 24-hour average PM_{10} levels of the federal standard is plotted in Figure 8.1-13, and the trend of expected violations of the state 24-hour standard of 50 $\mu g/m^3$ is plotted in Figure 8.1-14. Note that since PM_{10} is measured only once every six days, expected violation days are six times the number of measured violations.

TABLE 8.1-9
PM_{10} Levels in Livermore (Old First Street), 1990-1999 (µg/m^3)

Standard	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 24-Hour Average	137	155	99	84	96.9	51.7	71.1	61.6	62.3	86.6
Annual Geometric Mean (State Standard = 30 µg/m^3)	27.5	29.9	25.8	20.9	22.0	19.4	19.9	22.0	19.4	22.6
Annual Arithmetic Mean (Federal Standard = 50 µg/m^3)	32.6	36.1	29.0	24.4	26.0	22.3	22.0	24.3	21.3	25.6
Number of Days Exceeding:										
State Standard (50 µg/m^3, 24-hour)	10	12	5	3	4	1	1	2	2	3
Federal Standard (150 µg/m^3, 24-hour)	0	1	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

Table 8.1-10 shows the federal air quality standards for $PM_{2.5}$, maximum levels recorded at the Hazelton Street monitoring station in Stockton during 1990-1999, and 3-year averages for the same period. The 24-hour average concentrations have exceeded the standard occasionally throughout the 10-year period; however, the 3-year average of 98th percentile values has been below the standard since 1994. Annual average $PM_{2.5}$ levels have also occasionally exceeded the standard. As the standards have not yet been implemented, the attainment status of the Bay Area and San Joaquin Valley Air Basins has not yet been determined.

The trend of maximum 24-hour average $PM_{2.5}$ levels is plotted in Figure 8.1-15, and the trend of expected violations of the 24-hour standard is plotted in Figure 8.1-16. As for PM_{10}, $PM_{2.5}$ is measured only once every six days, so expected exceedances are six times the number of measured exceedances.

TABLE 8.1-10
$PM_{2.5}$ Levels in Stockton (Hazelton Street), 1990-1999 (µg/m^3)

Standard	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 24-Hour Average	66	94	58	75	69	53	64	67	81	56
Number of Days Exceeding:										
Federal Standard (65 µg/m^3, 24-hour)	1	4	0	2	1	0	0	1	2	0
98th Percentile	62.4	91.7	57.7	71.0	63.0	53.0	32.0	48.0	67.0	56.0
3-yr Average, 98th Percentile	--	75	71	73	64	62	49	44	49	57
Annual Arithmetic Mean	18.6	22.3	14.1	17.1	17.2	10.3	11.3	12.5	13.5	17.3
3-yr Annual Average (Federal Std = 15 µg/m^3)	--	20.8	18.3	17.9	16.1	14.9	12.9	11.4	12.4	14.4

Source: California Air Quality Data, Annual Summary, California Air Resources Board

8.1.3.6 Airborne Lead

Lead in the air results from the combustion of fuels that contain lead. Twenty-five years ago, motor gasolines contained relatively large amounts of lead compounds used as octane-rating

improvers, and ambient lead levels were relatively high. Beginning with the 1975 model year, new automobiles began to be equipped with exhaust catalysts, which were poisoned by the exhaust products of leaded gasoline. Thus, unleaded gasoline became the required fuel for an increasing fraction of new vehicles, and the phaseout of leaded gasoline began. As a result, ambient lead levels decreased dramatically. Both the Bay Area and San Joaquin Valley Air Basins have been in attainment of state and federal airborne lead levels for air quality planning purposes for a number of years.

The nearest station for which ambient lead data are available is Pittsburg. Table 8.1-11 lists the state air quality standard for airborne lead and the levels reported in Pittsburg between 1988 and 1997 (lead monitoring data are not available for Pittsburg after mid-1998). Maximum monthly levels are well below the state standard.

TABLE 8.1-11
Airborne Lead Levels at Pittsburg, 1988 to 1997 (µg/m^3)

Standard	1998	1989	1990	1991	1992	1993	1994	1995	1996	1997
Highest Monthly Average	.15	.15	.10	.09	.05	.06	.04	.06	.02	.01
Number of Days Exceeding State Standard (1.5 µg/m^3, monthly)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board

8.1.4 Affected Environment

The USEPA has responsibility for enforcing, on a national basis, the requirements of many of the country's environmental and hazardous waste laws. California is under the jurisdiction of USEPA Region IX, which has its offices in San Francisco. Region IX is responsible for the local administration of USEPA programs for California, Arizona, Nevada, Hawaii, and certain Pacific trust territories. USEPA's activities relative to the California air pollution control program focus principally on reviewing California's submittals for the State Implementation Plan (SIP). The SIP is required by the federal Clean Air Act to demonstrate how all areas of the state will meet the national ambient air quality standards within the federally specified deadlines (42 USC §7409, 7411).

The California Air Resources Board was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. CARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update as necessary the state's ambient air quality standards; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the SIP for achievement of the federal ambient air quality standards (California Health & Safety Code (H&SC) §39500 et seq.).

When the state's air pollution statutes were reorganized in the mid-1960s, local air pollution control districts (APCDs) were required to be established in each county of the state (H&SC §4000 et seq.). There are three different types of districts: county, regional, and unified. In addition, special air quality management districts (AQMDs), with more comprehensive authority over non-vehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California, including the San Francisco Bay Area (H&SC §40200 et seq.).

Air pollution control districts and air quality management districts in California have principal responsibility for developing plans for meeting the state and federal ambient air quality standards; for developing control measures for non-vehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards; for implementing permit programs established for the construction, modification, and operation of sources of air pollution; for enforcing air pollution statutes and regulations governing non-vehicular sources; and for developing employer-based trip reduction programs.

Each level of government has adopted specific regulations that limit emissions from stationary combustion sources, several of which are applicable to this project. The other agencies having permitting authority for this project are shown in Table 8.1-12. The applicable federal laws, ordinances, regulations and standards (LORS) and compliance with these requirements are discussed in more detail in the following sections. An application for a Determination of Compliance will be filed with the BAAQMD approximately one week after the Application for Certification (AFC) is filed with the Commission.

TABLE 8.1-12
Air Quality Agencies

Agency	Authority	Contact
USEPA Region IX	oversight of permit issuance, enforcement	Gerardo Rios, Chief Permits Office USEPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (415) 744-1259
California Air Resources Board	Regulatory oversight	Mike Tollstrup, Chief Project Assessment Branch California Air Resources Board 2020 L Street Sacramento, CA 95814 (916) 322-6026
Bay Area Air Quality Management District	permit issuance, enforcement	William deBoisblanc, Director of Permit Services Bay Area Air Quality Management District 939 Ellis Street San Francisco, CA 94109 (415) 749-4707

8.1.4.1 Laws, Ordinances, Regulations, and Standards

Federal.

Prevention of Significant Deterioration Program.

Authority: Clean Air Act §160-169A, 42 USC §7470-7491; 40 CFR Parts 51 and 52

Requirements: Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies with respect to attainment pollutants for which ambient concentrations are lower than the corresponding national ambient air quality standards (NAAQS). The following federal requirements apply on a pollutant-by-pollutant basis, depending on facility emission rates.

- Emissions must be controlled using Best Available Control Technology (BACT).
- Air quality impacts in combination with other increment-consuming sources must not exceed maximum allowable incremental increases for SO_2, PM_{10}, and NO_x.

- Air quality impacts of all sources in the area plus ambient pollutant background levels cannot exceed NAAQS.
- Pre- and/or post-construction air quality monitoring may be required.
- The air quality impacts on soils, vegetation, and nearby PSD Class I areas (specific national parks and wilderness areas) must be evaluated. (Note: EAEC is located in a Class II area.)

PSD review jurisdiction has been delegated to the Bay Area Air Quality Management District (BAAQMD) for all pollutants and is discussed further below under local LORS and conformance.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

New Source Review.
Authority: Clean Air Act §171-193, 42 USC §7501 et seq.; 40 CFR Parts 51 and 52

Requirement: Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. New source review applies with respect to nonattainment pollutants for which ambient concentration levels are higher than the corresponding NAAQS. The following federal requirements apply on a pollutant-by-pollutant basis, depending on facility emission rates.

- Emissions must be controlled to the lowest achievable emission rate (LAER).
- Sufficient offsetting emissions reductions must be obtained following the requirements in the regulations to continue reasonable further progress toward attainment of applicable NAAQS.
- The owner or operator of the new facility has demonstrated that major stationary sources owned or operated by the same entity in California are in compliance or on schedule for compliance with applicable emissions limitations in this rule.
- The administrator must find that the implementation plan has been adequately implemented.
- An analysis of alternatives must show that the benefits of the proposed source significantly outweigh any environmental and social costs.

New source review jurisdiction has been delegated to the BAAQMD for all pollutants and is discussed further under local LORS and conformance below.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

Acid Rain Program.
Authority: Clean Air Act §401 (Title IV), 42 USC §7651

Requirement: Requires the reduction of the adverse effects of acid deposition through reductions in emissions of sulfur dioxide and nitrogen oxides. BAAQMD has received delegation authority to implement Title IV.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

Title V Operating Permits Program.
Authority: Clean Air Act §501 (Title V), 42 USC §7661

Requirements: Establishes comprehensive operating permit program for major stationary sources. BAAQMD has received delegation authority for this program.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

National Standards of Performance for New Stationary Source.
Authority: Clean Air Act §111, 42 USC §7411; 40 CFR Part 60

Requirements: Establishes national standards of performance for new stationary sources. These standards are enforced at the local level with USEPA oversight. Relevant new stationary source performance standards are discussed under local LORS below.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

National Emission Standards for Hazardous Air Pollutants.
Authority: Clean Air Act §112, 42 USC §7412

Requirements: Establishes national emission standards for hazardous air pollutants. These standards are enforced at the local level with USEPA oversight and are further discussed under local LORS and conformance below.

Administering Agency: BAAQMD, with USEPA Region IX oversight.

State.
Nuisance Regulation.
Authority: CA Health & Safety Code §41700

Requirements: Provides that "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."

Administering Agency: BAAQMD and CARB

Toxic "Hot Spots" Act.
Authority: H& SC §44300-44384; 17 CCR §93300-93347

Requirements: Requires preparation and biennial updating of inventory of facility emissions of hazardous substances listed by CARB, in accordance with CARB's regulatory guidelines. Risk assessments are to be prepared by facilities required to submit emissions inventories according to local priorities.

Administering Agency: BAAQMD and CARB

CEC and CARB Memorandum of Understanding.
Authority: CA Pub. Res. Code §25523(a); 20 CCR §1752, 1752.5, 2300-2309 and Div. 2, Chap. 5, Art. 1, Appendix B, Part (k)

Requirements: Provides for the inclusion of requirements in the CEC's decision on an application for certification to assure protection of environmental quality; application is required to include information concerning air quality protection.

Administering Agency: California Energy Commission

Local.
District Regulations and Policies.
Authority: CA Health & Safety Code §40001

Requirements: Prohibit emissions and other discharges (such as smoke and odors) from specific sources of air pollution in excess of specified levels.

Administering Agency: BAAQMD, with CARB oversight.

8.1.4.2 Conformance of Facility

As addressed in this section, EAEC is designed, and will be constructed and operated, in accordance with all relevant federal, state, and local requirements and policies concerning protection of air quality.

Federal and Bay Area Air Quality Management District Prevention of Significant Deterioration Program. USEPA has promulgated PSD regulations for areas that are in compliance with national ambient air quality standards (40 CFR 52.21). The PSD program allows new sources of air pollution to be constructed, or existing sources to be modified, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., specific national parks and wilderness areas). USEPA has delegated the authority to implement the PSD program to various California air pollution control districts, including the BAAQMD where EAEC is located (40 CFR 52.21(u)).

The five principal areas of the federal PSD program are as follows:

- Applicability
- Best available control technology
- Pre-construction monitoring
- Increments analysis
- Air quality impact analysis

The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing stationary source. (These terms are defined in federal regulations.) (40 CFR 52.21) The determination of applicability is based on evaluating the emissions changes associated with the proposed project in addition to all other emissions changes at the same location since the applicable PSD baseline dates (40 CFR 52.21).

Under the BAAQMD PSD program (Regulation 2, Rule 2), best available control technology (BACT) must be applied when a new or modified source shows emission increases in excess of 10 pounds per highest day of precursor organic compounds (POC), nonprecursor organic compounds (NPOC), NO_x, SO_2, PM_{10}, or CO. The BAAQMD program also dictates that a permit for a project will be denied if specified emissions thresholds are exceeded unless air dispersion modeling shows that ambient air quality standards will not be violated and the applicable PSD increments, as defined in the PSD rule, will not be exceeded. The BAAQMD PSD emission threshold levels for requiring modeling are shown in Table 8.1-12. The PSD modeling requirements apply to all facilities with cumulative increases in emissions that exceed the levels shown in Table 8.1-13 on a pollutant-specific basis since the applicable PSD baseline date.

TABLE 8.1-13
BAAQMD PSD Emission Threshold Levels

Pollutant	Threshold Level
PM_{10}	15 tpy
NO_x	40 tpy
SO_2	40 tpy
POC	40 tpy
CO	100 tpy

The BAAQMD PSD program applies, on a pollutant-specific basis, only to a new major stationary source or to a major modification of an existing major stationary source that meets the following criteria:

- A new facility that will emit 100 tons per year (tpy) or more, and is one of the 28 PSD source categories in the federal Clean Air Act or any new facility that will emit 250 tpy or more; or
- A facility that emits 100 tpy or more with net emissions increases since the applicable PSD baseline date that exceed the threshold levels shown in Table 8.1-12.

Federal New Source Performance Standards. The Standards of Performance for New Stationary Sources are source-specific federal regulations, limiting the allowable emissions of criteria pollutants (i.e., those that have a national ambient air quality standard). These regulations apply to certain sources depending on the equipment size, process rate, and/or the date of construction, modification, or reconstruction of the affected facility. Recordkeeping, reporting, and monitoring requirements are usually necessary for the regulated pollutants from each subject source; the reports must be regularly submitted to the reviewing agency (40 CFR 60.4). As with the PSD program, this program has been delegated by USEPA to the BAAQMD. A summary of the BAAQMD New Source Performance Standards applicable to the project is provided in Section 8.1.4.2.

National Emissions Standards for Hazardous Air Pollutants. The National Emissions Standards for Hazardous Air Pollutants (NESHAPs) are either source-specific or pollutant-specific regulations, limiting the allowable emissions of hazardous air pollutants from the affected sources (40 CFR 61). Unlike criteria air pollutants, hazardous air pollutants do not have a national ambient air quality standard but have been identified by USEPA as causing or contributing to the adverse health effects of air pollution.

Administration of the hazardous air pollutants program has been delegated to the BAAQMD and is described in Section 8.1.4.2. (40 CFR 61.04).

Federal Clean Air Act Amendments of 1990. In November 1990, substantial revisions and updates to the federal Clean Air Act were signed into law. This complex enactment addresses a number of areas that could be relevant to EAEC, such as State Implementation Plan requirements for nonattainment areas that set new compliance deadlines and annual progress increments, more extensive permitting requirements, new USEPA mandates and deadlines for developing rules to control air toxic emissions, and acid deposition control. Following is a summary of the new provisions applicable to this project.

Title IV - Acid Deposition Control. This title requires the reduction of emissions of acidic compounds and their precursors (42 USC §7651 et seq.). The principal source of these

compounds is the combustion of fossil fuels. Other requirements include monitoring and recordkeeping for emissions of SO_2 and NO_x and for opacity and volumetric flow.

Title V - Operating Permits. This title establishes a comprehensive operating permit program for major stationary sources (42 USC §7661 et seq.). Under the Title V program, a single permit that includes a listing of all the stationary sources, applicable regulations, requirements, and compliance determination is required.

The BAAQMD's Major Facility Review Program (Regulation 2, Rule 6) has been approved by USEPA and includes the acid rain program. Consequently, the BAAQMD has received delegation to implement the Title IV and V programs. The BAAQMD Title IV and V permit programs applicable to this project are summarized below.

California Clean Air Act. AB 2595, the California Clean Air Act (Act), was enacted by the California Legislature and became law in January 1989. The Act requires the local air pollution control districts to attain and maintain both the federal and state ambient air quality standards at the "earliest practicable date." The Act contains several milestones for local districts and the California Air Resources Board. In 1993, the BAAQMD submitted to the Air Resources Board an air quality plan defining the program for meeting the required emission reduction milestones in the Bay Area. Several updates to the original plan have also been submitted.

Air quality plans must demonstrate attainment of the state ambient air quality standards and must result in a five percent annual reduction in emissions of nonattainment pollutants (ozone, CO, NO_x, SO_2, and their precursors) in a given district (H&SC §40914). A local district may adopt additional stationary source control measures or transportation control measures, revise existing source-specific or new source review rules, or expand its vehicle inspection and maintenance program (H&SC §40918) as part of the plan. District air quality plans specify the development and adoption of more stringent regulations to achieve the requirements of the Act. The applicable regulations that will apply to EAEC are included in the discussion of BAAQMD prohibitory rules in Section 8.1.4.2.

BAAQMD New Source Review Requirements. BAAQMD Regulation 2, Rule 2, New Source Review, requires that a pre-construction review be conducted for all proposed new or modified sources of air pollution. New Source Review contains three principal elements:

- Best available control technology (BACT)
- Emissions offsets
- Air quality impact analysis

BACT is required for all new sources or modifications of existing sources if emission increases caused by the project exceed 10 pounds per highest day of any criteria air pollutant. The district rule also contains separate BACT thresholds for 9 "non-criteria" pollutants, such as lead and various sulfur compounds.

The BAAQMD regulation further requires that for new or modified sources emitting in excess of 50 tons per year of POCs or NO_x, the total project emissions must be offset (i.e., an emission reduction comparable to the emission increase attributable to the source must be achieved at the project site or at another location). To ensure that there is no net increase in regional emissions as a result of new or modified sources, offsets at a ratio of 1.15 to 1.0 must be provided. For facilities emitting more than 15 but less than 50 tons per year of POCs

or NO_x, offsets are provided by the District from the Small Facility Banking account at a ratio of 1.0 to 1.0.

In addition, a Major Facility (100 tpy facility) is required to offset net emissions increases from a project, on a pollutant-specific basis, in excess of 1 tpy of PM_{10} and SO_2 that have occurred or will occur after April 5, 1991.

For the BAAQMD, the air quality impact analysis is the same as the PSD requirement: the project must not cause a violation or interfere with the maintenance of any ambient air quality standards or applicable increments.

Finally, the district may impose appropriate monitoring requirements to ensure compliance.

District Regulation 2, Rule 3 specifies procedures for review and standards for approval of Authorities to Construct power plants within the District. The applicant must obtain a Determination of Compliance and an Authority to Construct from the District prior to commencing construction. An application for a Determination of Compliance and an Authority to Construct is expected to be filed with the BAAQMD within one week of the filing of the AFC with the CEC. As the USEPA has delegated permitting authority to the BAAQMD, no application to the USEPA is required for this project.

Risk Management Policy. The District has developed a procedure for reviewing permit applications for projects that will emit compounds that may result in health impacts. The procedure requires comparing the potential emissions of toxic air contaminants from the project to specific levels, and requires the preparation of a written risk screening analysis if the levels are exceeded. The screening analysis includes estimates of the maximum annual concentrations of the toxic air contaminants, calculations of cancer risk, and comparison of maximum modeled concentrations with appropriate non-cancer threshold levels. The use of best available control technology for toxic air contaminant emissions is required if the incremental cancer risk from the project is projected to be between 1 and 10 in 1 million.

Other BAAQMD Regulatory Requirements. As required by the federal Clean Air Act and the California Clean Air Act, plans that demonstrate attainment must be developed for those areas that have not attained the national and state air quality standards (42 USC §7401; H&SC §40912). As part of its plan, the BAAQMD has developed regulations limiting emissions from specific sources. These regulations are collectively known as "prohibitory rules," because they prohibit the construction or operation of a source of pollution that would violate specific emission limits.

The general prohibitory rules of the BAAQMD applicable to EAEC are as follows:

Regulation 1-301 - Public Nuisance. Prohibits emissions in quantities that adversely affect public health, other businesses, or property.

Regulation 6 - Particulate Matter and Visible Emissions. Limits the visible emissions from the project to no darker than No. 1 when compared to a Ringelmann Chart for a period or periods aggregating more than 3 minutes in any hour. Opacity is limited to no greater than 20 percent from any source for a period or periods aggregating 3 minutes in any hour. Particulate emission concentrations cannot exceed 0.15 grains per dry standard cubic foot of exhaust gas volume.

Regulation 7 - Odorous Substances. Limits emission concentrations of dimethylsulfide, ammonia, mercaptan, phenols, and trimethylamine. This regulation becomes applicable upon confirmation of 10 or more odor complaints from the public within a 90-day period. Once the rule becomes applicable, it remains in effect for one year and can be re-triggered with the receipt of 5 or more odor complaints within a 90-day period.

Regulation 9, Rule 1 - Sulfur Dioxide. Limits stationary source emissions of sulfur dioxide to less than 300 ppm. In addition, the rule restricts sulfur dioxide emissions that will result in ground-level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

Regulation 9, Rule 2 - Hydrogen Sulfide. Limits the emission of hydrogen sulfide during any 24-hour period in such quantities that result in ground-level hydrogen sulfide concentrations in excess of 0.06 ppm averaged over 3 consecutive minutes or 0.03 ppm averaged over any 60 consecutive minutes.

Regulation 9, Rule 3 - Nitrogen Oxides From Heat Transfer Operations. Limits emissions of nitrogen oxides from new or modified heat transfer operations to less than 125 ppm.

Regulation 9, Rule 9 - Nitrogen Oxides from Stationary Gas Turbines. Limits emissions of nitrogen oxides from gas turbines during baseload operations to less than 9 ppmv corrected to 15 percent oxygen.

Regulation 11, Rule 10 - Hexavalent Chromium Emissions From Cooling Towers. Limits hexavalent chromium emissions from cooling towers by eliminating the use of chromium-based chemicals.

BAAQMD New Source Performance Standards. Regulation 10 (40 CFR 60 Subpart GG) - Standards of Performance for Stationary Gas Turbines. The BAAQMD has adopted by reference the federal New Source Performance Standard (NSPS) for stationary gas turbines. This regulation requires monitoring of sulfur and nitrogen in the fuel; limits emissions of NO_x and SO_2 emissions; requires source testing of emissions; requires emissions monitoring; and requires recordkeeping for the collected data.

Regulation 10 (40 CFR 60 Subpart Da) – Standards of Performance for Electric Utility Steam Generating Units for which Construction is Commenced after September 18, 1978. The BAAQMD has adopted by reference the federal New Source Performance Standard (NSPS) for units that are capable of combusting more than 250 MMBtu/hr. The natural gas-fired NOx emission limit is 0.20 lb/MMBtu.

BAAQMD Hazardous Air Pollutants. EPA is in the process of establishing a NESHAP for gas turbines. This regulation will apply to new or modified major sources of HAPs (as listed in Section 112 of the Clean Air Act). Because the HAP emissions for the project are below the major source thresholds of 10 tpy for a single HAP and 25 tpy for any combination of HAPs, the project is exempt from the NESHAP for gas turbines. Consequently, this regulation does not apply to the project and will not be addressed further. Please note that while Section 5.16 shows ammonia emissions greater than 25 tpy for the project, ammonia is not a HAP as defined by Section 112 of the Clean Air Act.

BAAQMD Title IV and Title V Programs.

BAAQMD Regulation 2, Rule 6 - Major Facility Review. This rule implements the operating permit requirements of Title V of the federal Clean Air Act. The rule applies to major facilities, Phase II acid rain facilities, subject solid waste incinerator facilities, and any facility listed by USEPA as requiring a Title V permit. As a Phase II acid rain facility, EAEC will be required to submit a permit application to undergo a major facility review within 12 months of commencement of facility operation.

The BAAQMD has adopted by reference the federal Title IV (Acid Rain) Regulation and is now responsible for implementing the program through the Title V operating permit program. Under Title IV, a project must comply with maximum operating emissions levels for SO_2 and NO_x and is required to install and operate continuous monitoring systems for SO_2, NO_x, and CO_2 emissions. Extensive recordkeeping and reporting requirements are also part of the acid rain program.

The LORS applicable to the protection of air quality for the EAEC project are listed in Table 8.1-14.

8.1.5 Environmental Impacts

8.1.5.1 Overview of the Analytical Approach to Estimating Facility Impacts

The emissions sources at EAEC include three gas turbines with heat recovery steam generators and supplemental burners (duct burners), one steam turbine, an auxiliary boiler and a cooling tower, plus minor auxiliary equipment (emergency generator and fire pump engine). The actual operation of the turbines will range between 70 percent and 100 percent of their maximum rated output. Supplemental firing will be provided by the duct burners as needed to maintain required electricity and steam production rates. Evaporative inlet air cooling and steam injection will be used to increase power output under certain conditions as well. The auxiliary boiler will be used to provide additional steam for auxiliary purposes. Emission control systems will be fully operational during all operations except startups and shutdowns. Maximum annual emissions are based on operation of EAEC at maximum firing rates and include the expected maximum number of startups that may occur in a year. Each turbine startup will result in transient emission rates until steady-state operation for the gas turbine and emission control systems is achieved.

Ambient air quality impact analyses for the site have been conducted to satisfy the CEC requirements for criteria pollutants (NO_2, CO, PM_{10}, and SO_2), noncriteria pollutants, and construction impacts on a pollutant-specific basis. The following sections describe the emission sources that have been evaluated for EAEC, the ambient impact analyses results, and the evaluation of facility compliance with the applicable air quality regulations, including BAAQMD Regulation 2 (Permits), and Rule 2 (New Source Review). Rule 2 includes both the District's NSR and PSD requirements.

Facility Emissions. The proposed project will be a new source. As discussed in Section 2, the new equipment will consist of three General Electric 7251 (7FB) combustion turbines (or equivalent), rated at 200 MW (nominal net, at site design conditions); three heat recovery steam generators (HRSGs) equipped with duct burners rated at 732 MMBtu/hr (HHV, each); a 560-MW (nominal) condensing steam turbine; one 100,000 lb/hr auxiliary boiler; and a 19-cell cooling tower. Incidental equipment will include a 370 hp Diesel fire pump

TABLE 8.1-14
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Section)
Federal					
Clean Air Act (CAA) §160-169A and implementing regulations, Title 42 United States Code (USC) §7470-7491 (42 USC 7470-7491), Title 40 Code of Federal Regulations (CFR) Parts 51 & 52 (40 CFR 51 & 52). (Prevention of Significant Deterioration Program)	Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies to pollutants for which ambient concentrations are lower than NAAQS.	BAAQMD with USEPA oversight	After project review, issues Authority to Construct (ATC) with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.1 (p. 50), 8.1.4.2.1 (p.18), Appendices 8.1D, 8.1F
CAA §171-193, 42 USC §7501 et seq. (New Source Review)	Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS.	BAAQMD with USEPA oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.1 (p. 50), 8.1.4.2.1 (p.18), Appendices 8.1F, 8.1G
CAA §401 (Title IV), 42 USC §7651 (Acid Rain Program)	Requires reductions in NOx and SO2 emissions.	BAAQMD with USEPA oversight	Issues Acid Rain permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.4.2.4 (p.19)
CAA §501 (Title V), 42 USC §7661 (Federal Operating Permits Program)	Establishes comprehensive permit program for major stationary sources.	BAAQMD with USEPA oversight	Issues Title V permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.4.2.4 (p.19)
CAA §111, 42 USC §7411, 40 CFR Part 60 (New Source Performance Standards - NSPS)	Establishes national standards of performance for new stationary sources.	BAAQMD with USEPA oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6 (p. 50), 8.1.4.2.2 (p. 19)
CAA §112, 42 USC §7412, 40 CFR Part 63 (National Emission Standards for Hazardous Air Pollutants - NESHAPs)	Establishes national emission standards for hazardous air pollutants.	BAAQMD with USEPA oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6 (p. 50), 8.1.4.2.3 (p. 19)
State					
California Health & Safety Code (H&SC) §41700 (Nuisance Regulation)	Outlaws discharge of such quantities of air contaminants that cause injury, detriment, nuisance, or annoyance.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.4.1.2 (p. 17)

TABLE 8.1-14
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Section)
H&SC §44300-44384; California Code of Regulations (CCR) §93300-93347 (Toxic "Hot Spots" Act)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Screening HRA submitted before start of construction.	8.1.5.2 (p.46), 8.1.4.1.2 (p.17), Appendix 8.1D
California Public Resources Code §25523(a); 20 CCR §1752, 2300-2309 (CEC & CARB Memorandum of Understanding)	Requires that CEC's decision on AFC include requirements to assure protection of environmental quality; AFC required to address air quality protection.	CEC	After project review, issues Final Determination of Compliance (FDOC) with conditions limiting emissions.	CEC approval of AFC, i.e., FDOC, to be obtained before start of construction.	8.1.4.1.2 (p. 17)
Local					
BAAQMD Regulation 1 §301(Public Nuisance)	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p.50), 8.1.4.2.8 (p.21)
BAAQMD Regulation 2 (Permits), Rule 2 (New Source Review)	NSR and PSD: Requires that preconstruction review be conducted for all proposed new or modified sources of air pollution, including BACT, emissions offsets, and air quality impact analysis.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.5.1, 8.1.5.2, 8.1.5.3, 8.1.5.4 (pp. 26-49), 8.1.6.3 (p.50), 8.1.4.2.6 (p. 20), Appendices 8.1C, 8.1D, 8.1F, 8.1G
BAAQMD Regulation 2, Rule 6 (Major Facility Review)	Implements operating permits requirements of CAA Title V and acid rain regulations of CAA Title IV.	BAAQMD	Issues Title V permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.6.1 (p. 50), 8.1.4.2.4 (p. 19), 8.1.4.2.11 (p. 23)
BAAQMD Regulation 6 (Particulate Matter and Visible Emissions)	Limits visible emissions to no darker than Ringelmann No. 1 for periods greater than 3 minutes in any hour; limits PM emissions to #0.15 gr/dscf.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 50), 8.1.4.2.8 (p. 21)
BAAQMD Regulation 7 (Odorous Substances)	Limits emissions of dimethylsulfide, ammonia, mercaptan, phenols, and trimethylamine; becomes applicable upon confirmation of 10 or more odor complaints with 90 days.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.5.1.1 (p. 26), 8.1.6.3 (p. 50), 8.1.4.2.8 (p. 21)
BAAQMD Regulation 9, Rule 1 (Sulfur Dioxide)	Limits SO_2 emissions to <300 ppm; also limits SO_2 emissions resulting in ground level concentrations of specified level and duration.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.5.1.1 (p. 26), 8.1.6.3 (p. 50), 8.1.4.2.8 (p. 22)

TABLE 8.1-14
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Section)
BAAQMD Regulation 9, Rule 2 (Hydrogen Sulfide)	Limits H_2S emissions during any 24-hour period that result in ground level H_2S concentrations exceeding specified levels and durations.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 50), 8.1.4.2.8 (p. 22)
BAAQMD Regulation 9, Rule 3 (Heat Transfer Operation NO_x Emissions Limits)	Limits NO_x emissions from new heat transfer operations $250 MMBtu/hr maximum to <125 ppm.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 50), 8.1.4.2.8 (p. 22)
BAAQMD Regulation 9, Rule 9 (Nitrogen Oxides from Stationary Gas Turbines)	Limits NO_x emissions during baseload operations to 9 ppmv @ 15 percent exhaust oxygen (15 ppmv if SCR is not used).	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 50), 8.1.4.2.8 (p. 22)
BAAQMD Regulation 10 (40 CFR 60 Subpart GG) (Standards of Performance for Stationary Gas Turbines)	Requires monitoring of fuel, other operating parameters; limits NO_x and SO_2 emissions, requires source testing, emissions monitoring, and recordkeeping.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 50), 8.1.4.2.8 (p. 22)
BAAQMD Regulation 10 (40 CFR 60 Subpart Db) (Standards of Performance for Electric Utility Steam Generating Units for which Construction is Commenced after September 18,1978)	Requires monitoring of fuel, other operating parameters; limits NO_x and SO_2 emissions, requires source testing, emissions monitoring, and recordkeeping.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.6.3 (p. 50), 8.1.4.2.8 (p. 22)
BAAQMD Regulation 11, (Hazardous Pollutants)	Implements federal NESHAP regulations.	BAAQMD with CARB oversight	After project review, issues ATC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.4.1.1 (p. 17), 8.1.4.2.3 (p. 19),

and a 1,040 kW natural gas-fired emergency generator. Specifications for the turbines/ HRSGs, the auxiliary boiler, the cooling tower, and the emergency equipment are provided in Appendix 8.1A, Tables 8.1A-1 through 8.1A-5. Natural gas will be the only fuel consumed during operation of EAEC. There will be no distillate fuel oil firing at EAEC except in the fire pump emergency generator. Typical specifications for the natural gas fuel are shown in Table 8.1-15.

Natural gas combustion results in the formation of NO_x, SO_2, unburned hydrocarbons (POC), PM_{10}, and CO. Because natural gas is a clean burning fuel, there will be minimal formation of combustion PM_{10} and SO_2. The combustion turbines will be equipped with dry low-NO_x combustors that minimize the formation of NO_x and CO. To further reduce NO_x emissions, selective catalytic reduction (SCR) and oxidation catalyst control systems will be utilized. The duct burners and auxiliary boiler will also be equipped with a low-NO_x burner design that minimizes NO_x formation. The auxiliary boiler will also be equipped with an oxidation catalyst to control CO emissions.

TABLE 8.1-15
Typical Chemical Characteristics and Heating Value of Natural Gas

Constituent	Mole %
Nitrogen	1.000
CO_2	0.338
Methane	95.619
Ethane	2.647
Propane	0.300
I-Butane	0.000
N-Butane	0.076
I-Pentane	0.000
N-Pentane	0.019
C 6+	0.001
HHV	23,167 Btu/lbm 1,021 Btu/scf

Various noncriteria pollutants will also be emitted by the facility, including ammonia (NH_3), which is used as a reactant by the SCR system to control NO_x, and sulfate (or secondary particulate matter) due to the oxidation of the SO_2 emitted by the facility. Emissions of all of the criteria and noncriteria pollutants have been characterized and quantified in this application.

Criteria Pollutant Emissions. The gas turbine, duct burner, and auxiliary boiler emission rates have been estimated from vendor data, EAEC design criteria, and established emission calculation procedures. The emission rates for the combustion turbines alone, the combustion turbines with duct burners and power augmentation, and the auxiliary boiler alone are shown in Tables 8.1-16, 8.1-17, and 8.1-18, respectively.

TABLE 8.1-16
Maximum Pollutant Emission Rates Each Gas Turbine[a]

Pollutant	ppmvd @ 15% O_2	lb/MMBtu	lb/hr
NO_x	2.50[b,c]	0.009	17.19
CO	6.00[b]	0.0132	25.12
POC	1.17[b]	0.0014	2.65
PM_{10}[d]	-	0.0074	11.0
SO_2[e]	0.12	0.0007	1.32

Basis:
a. Emission rates shown reflect the highest value with no power augmentation or steam injection at any operating load. For NOx, CO and POC, values exclude startups and shutdowns.
b. EAEC design criteria.
c. Average annual NOx concentration will be 2.0 ppm.
d. 100 percent of particulate matter emissions assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
e. Based on expected fuel sulfur content of 0.25 grains/100 scf.

TABLE 8.1-17
Maximum Pollutant Emission Rates
Each Turbine with Duct Burner and Power Augmentation

Pollutant	ppmvd @ 15% O_2	lb/MMBtu	lb/hr
NO_x	2.50[a,b]	0.009	23.80
CO	6.00[a]	0.0132	34.80
POC	2.00[a]	0.0014	6.64
PM_{10}[c]	-	0.0072	18.32
SO_2[d]	0.12	0.0007	1.84

Basis:
a. EAEC design criteria.
b. Average annual NOx concentration will be 2.0 ppm.
c. 100 percent of particulate matter emissions assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
d. Based on expected fuel sulfur content of 0.25 grains/100 scf.

TABLE 8.1-18
Maximum Pollutant Emission Rates Auxiliary Boiler[a]

Pollutant	ppmvd @ 3% O_2	lb/MMBtu	lb/hr
NO_x	9.0[b]	0.0116	1.50
CO	50.0[b]	0.0388	5.00
POC	10.0[b]	0.0047	0.60
PM_{10}[c]	N/A	0.0209	2.70
SO_2[d]	0.14[d]	0.0007	0.09

Basis:
a. Emission rates shown reflect the highest value at any operating load.
b. EAEC specification.
c. 100 percent of particulate matter emissions were assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
d. Based on expected fuel sulfur content of 0.25 grains/100 scf.

The maximum firing rates, daily and annual fuel consumption rates, and operating restrictions define the allowable operations that determine the maximum potential hourly, daily, and annual emissions for each pollutant. These allowable operations are typically referred to as "the operating envelope" for a facility. The maximum heat input rates (fuel consumption rates) for the gas turbines, duct burners, and auxiliary boiler are shown in Table 8.1-19.

TABLE 8.1-19
Maximum Facility Heat Input Rates (HHV) (MMBtu)

Period	Total Fuel Use (all Units)	Gas Turbines Plus Duct Burners (each[a])	Gas Turbines (each[b])	Auxiliary Boiler
Per Hour	8,021	2,631	1899	129
Per Day	172,882	42,093[c]	15,190[d]	1,032[e]
Per Year	61,487,064	13,417,080[c]	6,949,608[d]	387,000[e]

Notes:
a. Based on maximum heat input for full load operation at 45 deg. F plus duct burner with power augmentation.
b. Based on maximum heat input for full load turbine operation at 45 deg. F.
c. Based on maximum of 16 hours per day and 5,100 hours per year per duct burner.
d. Based on balance of day (8 hours) and balance of year (3,660 hours); includes cold and hot starts.
e. Based on maximum of 8 hours per day and 3,000 hours per year of operation.

Maximum emission rates expected to occur during a startup or shutdown are shown in Table 8.1-20. PM_{10} and SO_2 emissions have not been included in this table because emissions of these pollutants will be lower during a startup period than during baseload facility operation.

TABLE 8.1-20
Maximum Facility Startup Emission Rates[a]

	NO_x	CO	POC
Cold Start, lb/hour	80	838	16
Cold Start, lb/start[b]	240	2,514	48
Hot Start, lbs/start[c]	80	902	16

Basis:
a. Estimated based on vendor data and source test data. See Appendix 8.1A, Table 8.1A-7a and 7b.
b. Maximum of three hours per cold start.
c. Maximum of one hour per hot start.

The analysis of maximum facility emissions was based on the turbine/HRSG and auxiliary boiler emission factors shown in Tables 8.1-16, 8.1-17, and 8.1-18; the EAEC operating envelope shown in Table 8.1-19; the EAEC startup emission rates shown in Table 8.1-20 and the ambient conditions that result in the highest emission rates. The maximum annual, daily, and hourly emissions for EAEC are shown in Table 8.1-21. Detailed emission calculations appear in Appendix 8.1A, Table 8.1A-8. Emissions from the cooling tower were calculated from the maximum cooling water TDS level (see Table 8.1A-3). Auxiliary boiler emissions characteristics are shown in Table 8.1A-2.

The emergency generator and emergency generator are exempt from permitting under BAAQMD Rule 2-1-114.2.3. A risk screening analysis is included in Section 8.1.5.2 to demonstrate that the Diesel-fired fire pump will not cause a significant carcinogenic risk, as required under Rule 2-1-316.1.

TABLE 8.1-21
Emissions from New Equipment[a]

Emissions/Equipment	NO_x	SO_2	CO	POC	PM_{10}
Maximum Hourly Emissions, lb/hr					
Turbines and Duct Burners[b]	240.0	5.4	2,706.0	48.0	55.0
Cooling Tower	-	-	-	-	2.4
Auxiliary Boiler	1.50	0.1	5.0	0.6	2.7
Emergency Generator[c]	6.5	0.01	6.8	2.9	0.5
Fire Pump Engine[c]	4.4	0.13	2.6	0.54	0.19
Total Project, pounds per hour[d]	**248.0**	**5.7**	**2,717.8**	**51.5**	**60.6**
Maximum Daily Emissions, lb/day					
Turbines and Duct Burners[b]	2,308.8	120.0	12,219.9	542.4	1,143.3
Cooling Tower	-	-	-	-	57.6
Auxiliary Boiler[d]	12.0	0.60	40.0	4.8	21.6
Emergency Generator[c]	6.5	0.01	6.8	2.9	0.5
Fire Pump Engine[c]	4.4	0.13	2.6	0.54	0.19
Total Project, pounds per day[d]	**2,327.1**	**120.8**	**12,266.6**	**550.2**	**1,223.0**
Maximum Annual Emissions, tpy					
Turbines and Duct Burners[b]	260.9	21.32	915.86	73.35	200.54
Cooling Tower	-	-	-	-	12.4
Auxiliary Boiler[d]	2.3	0.1	7.5	0.9	4.1
Total Permitted Emissions, tons per year[d,e]	**260.9**	**21.3**	**915.9**	**73.4**	**211.0**
Emergency Generator	0.6	<0.1	0.7	0.3	0.1
Fire Pump Engine	0.22	<0.1	0.1	<0.1	<0.1
Total Project, tons per year [d,e]	**261.8**	**21.3**	**916.7**	**73.7**	**211.2**

Notes:
[a] See Appendix 8.1A, Table 8.1A-8 for calculations.
[b] Includes startup emissions.
[c] Emergency generator (200 hrs/yr) and Diesel fire pump engine (100 hrs/yr) will not be tested on the same day. Total hourly and daily emissions reflect the higher of the two units' emissions.
[d] Numbers may not add directly due to rounding.
[e] Annual facility emissions will be managed to maintain emissions below the levels shown.

Noncriteria Pollutant Emissions. Noncriteria pollutants are compounds that have been identified as pollutants that pose a significant health hazard. Nine of these pollutants are regulated under the federal New Source Review program: lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds.[3] In addition to these nine compounds, the federal Clean Air Act lists 189 substances as potential hazardous air pollutants (Clean Air Act Sec. 112(b)(1)). The BAAQMD has also published a list of compounds it defines as potential toxic air contaminants (Toxics Policy, May 1991; Rule 2-1-316). Any pollutant that may be emitted from EAEC and is on the federal New Source Review list, the federal Clean Air Act list, and/or the District toxic air contaminant list has been evaluated as part of the AFC. Emission factors were determined by reviewing the available technical data, determining the products of combustion, and/or using material balance calculations.

Noncriteria pollutant emission factors recommended by the BAAQMD staff were used for the analysis of emissions from the gas turbines and auxiliary boiler. The recommended factors were taken from data compiled by the Ventura County APCD and from the California Air Toxics Emission Factors (CATEF) database. The acute hazard index calculation incorporated a more appropriate emission factor for acrolein from large gas turbines equipped with dry low-NOx combustors. The factor shown in the CATEF database,

[3] These pollutants are regulated under federal and state air quality programs; however, they are evaluated as noncriteria pollutants by the California Energy Commission.

$2.37x10^{-2}$ lb/MMcf, was based on the average of source test results from four gas turbines. A review of the gas turbines on which the test data were based indicated that only one of the turbines tested was an engine that could be considered comparable to the turbines proposed for use at the East Altamont Energy Center. The average of three test results for this unit yielded an emission factor of $6.43x10^{-3}$ lb/MMcf. It was our judgment that the source test results from one comparable gas turbine better represented acrolein emissions from the frame turbines to be used at East Altamont than the composite emission factor that included dissimilar turbines. Noncriteria pollutant emissions from the cooling tower were calculated from an analysis of cooling tower water supplies (see Section 8.14).

The noncriteria pollutants that may be emitted from EAEC, and their respective emission factors, are shown in Table 8.1-22. Appendix 8.1A, Tables 8.1A-9a, 8.1A-9b and 8.1A-9c provide the detailed emission calculations for noncriteria pollutants with the exception of ammonia, which is addressed separately in Appendix 8.1A, Table 8.1A-10. Although the turbines/HRSGs and auxiliary boiler will be equipped with oxidation catalyst systems, no control of noncriteria pollutants has been assumed.

Air Quality Impact Analysis.

Air Quality Modeling Methodology. An assessment of impacts from EAEC on ambient air quality has been conducted using USEPA-approved air quality dispersion models. These models are based on various mathematical descriptions of atmospheric diffusion and dispersion processes in which a pollutant source impact can be calculated over a given area.

The impact analysis was used to determine the worst-case ground-level impacts of EAEC. The results were compared with established state and federal ambient air quality standards and PSD significance levels. If the standards are not exceeded then it is assumed that, in the operation of the facility, no exceedances are expected under any conditions. In accordance with the air quality impact analysis guidelines developed by USEPA (40 CFR Part 51, Appendix W: *Guideline on Air Quality Models*) and CARB (*Reference Document for California Statewide Modeling Guideline*, April 1989), the ground-level impact analysis includes the following assessments:

- Impacts in simple, intermediate, and complex terrain,
- Aerodynamic effects (downwash) due to nearby building(s) and structures, and
- Impacts from inversion breakup (fumigation).

Simple, intermediate, and complex terrain impacts were assessed for all meteorological conditions that would limit the amount of final plume rise. Plume impaction on elevated terrain, such as on the slope of a nearby hill, can cause high ground-level concentrations, especially under stable atmospheric conditions. Another dispersion condition that can cause high ground-level pollutant concentrations is caused by building downwash. Building downwash can occur when wind speeds are high and a building or structure is in close proximity to the emission stack. This can result in building wake effects where the plume is drawn down toward the ground by the lower pressure region that exists in the lee side (downwind) of the building or structure.

Fumigation conditions occur when the plume is emitted into a low lying layer of stable air (inversion) that then becomes unstable, resulting in a rapid mixing of pollutants towards the ground. The low mixing height that results from this condition allows little diffusion of the

stack plume before it is carried downwind to the ground. Although fumigation conditions rarely last as long as an hour, relatively high ground-level concentrations may be reached during that period. Fumigation tends to occur under clear skies and light winds, and is more prevalent in the summer.

TABLE 8.1-22
Noncriteria Pollutant Emissions for the EAEC Facility

Pollutant	Emission Factor (lb/MMscf)	Emissions lb/hr	Emissions ton/yr
Gas Turbines (with Duct Burners) (each)			
Ammonia	-[a]	35.3	136.6
Propylene	7.70×10^{-1}	1.98	7.68
HAPs			
Acetaldehyde	6.86×10^{-2}	0.18	0.68
Acrolein	6.43×10^{-2}	0.02	0.06
Benzene	1.36×10^{-2}	0.04	0.14
1,3-Butadiene	1.27×10^{-4}	3.27×10^{-4}	1.27×10^{-3}
Ethylbenzene	1.79×10^{-2}	0.05	0.18
Formaldehyde	1.10×10^{-1}	0.28	1.10
Hexane	2.59×10^{-1}	0.67	2.58
Naphthalene	1.66×10^{-3}	4.28×10^{-3}	1.66×10^{-2}
Polycyclic Aromatics	2.23×10^{-3}	1.70×10^{-3}	6.58×10^{-3}
Propylene Oxide	4.78×10^{-2}	0.12	0.48
Toluene	7.10×10^{-2}	0.18	0.71
Xylene	2.61×10^{-2}	0.07	0.26
Total HAPs (three turbines)			18.64
Auxiliary Boiler			
Ammonia	-[a]	0.61	0.91
Propylene	0.1553	<0.01	<0.01
HAPs			
Acetaldehyde	8.9×10^{-3}	<0.01	<0.01
Acrolein	8.0×10^{-4}	<0.01	<0.01
Benzene	4.31×10^{-3}	<0.01	<0.01
1,3-Butadiene	-	-	-
Ethylbenzene	2.0×10^{-3}	<0.01	<0.01
Formaldehyde	0.221	0.01	<0.01
Hexane	1.3×10^{-3}	<0.01	<0.01
Naphthalene	3.0×10^{-4}	<0.01	<0.01
Polycyclic Aromatics	4.0×10^{-4}	<0.01	<0.01
Propylene Oxide	-	-	-
Toluene	7.8×10^{-3}	<0.01	<0.01
Xylene	5.8×10^{-3}	<0.01	<0.01
Total HAPs			0.05
Cooling Tower (emission factors in ppm; see text)			
Ammonia	6	<0.01	0.02

TABLE 8.1-22
Noncriteria Pollutant Emissions for the EAEC Facility

Pollutant	Emission Factor (lb/MMscf)	Emissions lb/hr	Emissions ton/yr
Copper	0.0032	<0.01	<0.01
Silver	0.08	<0.01	<0.01
Zinc	0.056	<0.01	<0.01
HAPs			
Arsenic	0.016	<0.01	<0.01
Cadmium	0.008	<0.01	<0.01
Chromium III	0.136	<0.01	<0.01
Lead	0.0218	<0.01	<0.01
Mercury	0.008	<0.01	<0.01
Nickel	0.08	<0.01	<0.01
Total HAPs			<0.01

[a]Ammonia emissions calculated from 10 ppm ammonia slip rate. See Appendix 8.1A, Table 8.1A-10.

The basic model equation used in this analysis assumes that the concentrations of emissions within a plume can be characterized by a Gaussian distribution about the centerline of the plume (see Figure 8.1-17). Concentrations at any location downwind of a point source such as a stack can be determined from the following equation:

$$C(x,y,z,H) = \left(\frac{Q}{2\pi\sigma_y\sigma_z u}\right) * \left(e^{-1/2(y/\sigma_y)^2}\right) * \left[\left\{e^{-1/2(z-H/\sigma_z)^2}\right\} + \left\{e^{-1/2(z+H/\sigma_z)^2}\right\}\right]$$

where

C	=	the concentration in the air of the substance or pollutant in question
Q	=	the pollutant emission rate
$\sigma_y\sigma_z$	=	the horizontal and vertical dispersion coefficients, respectively, at downwind distance x
u	=	the wind speed at the height of the plume center
x,y,z	=	the variables that define the 3-dimensional Cartesian coordinate system used; the downwind, crosswind, and vertical distances from the base of the stack (see Figure 8.1-17)
H	=	the height of the plume above the stack base (the sum of the height of the stack and the vertical distance that the plume rises due to the momentum and/or buoyancy of the plume)

Gaussian dispersion models are approved by USEPA for regulatory use and are based on conservative assumptions (i.e., the models tend to overpredict actual impacts by assuming steady state conditions, no pollutant loss through conservation of mass, no chemical reactions, etc.). The USEPA models were used to determine if ambient air quality standards would be exceeded, and whether a more accurate and sophisticated modeling procedure would be warranted to make the impact determination. The following sections describe:

- Screening modeling procedures

- Refined air quality impact analysis
- Existing ambient pollutant concentrations and preconstruction monitoring
- Results of the ambient air quality modeling analyses
- PSD increment consumption

The screening and refined air quality impact analyses were performed using the Industrial Source Complex, Short-Term Model ISCST3 (Version 00101).[4] ISCST3 is a Gaussian dispersion model capable of assessing impacts from a variety of source types in areas of simple, intermediate, and complex terrain. The model can account for settling and dry deposition of particulates; area, line, and volume source types; downwash effects; and gradual plume rise as a function of downwind distance. The model is capable of estimating concentrations for a wide range of averaging times (from one hour to one year).

Inputs required by the ISCST3 model include the following:

- Model options
- Meteorological data
- Source data
- Receptor data

Model options refer to user selections that account for conditions specific to the area being modeled or to the emissions source that needs to be examined. Examples of model options include use of site-specific vertical profiles of wind speed and temperature; consideration of stack and building wake effects; and time-dependent exponential decay of pollutants. The model supplies recommended default options for the user. Except where explicitly stated, such as for building downwash, as described in more detail below, default values were used. A number of these default values are required for USEPA and local District approval of model results and are listed below.

- Rural dispersion coefficients
- Gradual plume rise
- Stack tip downwash
- Buoyancy induced dispersion
- Calm processing
- Default rural wind profile exponents = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55
- Default vertical temperature gradients = 0.02, 0.035
- 10 meter anemometer height

ISCST3 uses hourly meteorological data to characterize plume dispersion. The representativeness of the data is dependent on the proximity of the meteorological monitoring site to the area under consideration; the complexity of the terrain, the exposure of the meteorological monitoring site, and the period of time during which the data are collected. The meteorological data used in this analysis were collected at the Tracy monitoring station approximately nine km southeast of the project site. This data set was selected to be representative of meteorological conditions at the EAEC site and to meet the requirements of the USEPA "On-Site Meteorological Program Guidance for Regulatory

[4] In accordance with BAAQMD guidance, one-hour average NO_2 concentrations were modeled using ISC_OLM (Version 96113). See discussion under "Specialized Modeling Analyses."

Model Applications" (EPA-450/4-87-013, August 1995). A detailed discussion of the representativeness of the meteorological data has been provided to the BAAQMD and CEC in the modeling protocol and subsequent correspondence (see Appendix 8.1B, Attachment 8.1B-1).

The required emission source data inputs to ISCST3 include source locations, source elevations, stack heights, stack diameters, stack exit temperatures and velocities, and emission rates. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used is the Universal Transverse Mercator Projection (UTM). The stack height that can be used in the model is limited by federal and BAAQMD Good Engineering Practice (GEP) stack height restrictions, discussed in more detail below. In addition, ISCST3 requires nearby building dimension data to calculate the impacts of building downwash.

For the purposes of modeling, a stack height beyond what is required by Good Engineering Practices is not allowed (BAAQMD Regulation 2-2-418). However, this requirement does not place a limit on the actual constructed height of a stack. GEP as used in modeling analyses is the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. In addition, the GEP modeling restriction assures that any required regulatory control measure is not compromised by the effect of that portion of the stack that exceeds the GEP. The USEPA guidance ("Guideline for Determination of Good Engineering Practice Stack Height," Revised 6/85) for determining GEP stack height is as follows:

$$H_g = H + 1.5L$$

where

H_g = Good Engineering Practice stack height, measured from the ground-level elevation at the base of the stack

H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack

L = lesser dimension, height or maximum projected width, of nearby structure(s)

In using this equation, the guidance document indicates that both the height and width of the structure are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind.

For the turbine/HRSG stacks, the nearby (influencing) structures are the HRSGs, which are 80 feet (24.38 m) high and 98 feet (30 m) long. Thus H = 80 ft and L = 98 feet, and H_g = 80 ft + (1.5 * 80 ft) = 200 ft, and the proposed stack height of 175 feet does not exceed GEP stack height.

For regulatory applications, a building is considered sufficiently close to a stack to cause wake effects when the downwind distance between the stack and the nearest part of the building is less than or equal to five times the lesser of the height or the projected width of the building. Building dimensions for the buildings analyzed as downwash structures were

obtained from digital EAEC plot plans. The building dimensions were analyzed using the Building Profile Input Program (BPIP) to calculate 36 wind-direction-specific building heights and projected building widths for use in building wake calculations. The building dimensions used in the GEP analysis are shown in Appendix 8.1B, Table 8.1B-1 and Figure 8.1B-1.

Screening Procedures. To ensure the impacts analyzed were for maximum emission levels and worst-case dispersion conditions, a screening procedure was used to determine the inputs to the impact modeling. The screening procedure analyzed the turbine operating conditions that would result in the maximum impacts on a pollutant-specific basis. The operating conditions examined in this screening analysis, along with their exhaust and emission characteristics, are shown in Appendix 8.1B, Table 8.1B-2. These operating conditions represent maximum and minimum turbine loads (100 percent and 70 percent) at maximum and minimum ambient operating temperatures (98°F and 45°F).

The operating conditions were screened for worst-case ambient impact using USEPA's ISCST3 model and three years of meteorological data collected at the Tracy monitoring station, as described above. The results of the screening procedure are presented in Appendix 8.1B, Table 8.1B-3. The screening analysis showed that except for the 24-hour averaging period, impacts under Case M (turbine operating at 100 percent load with power augmentation and duct burning at hot ambient temperature) were the highest for each pollutant and averaging period. Case D had the highest 24-hour average SO_2 impacts; Case K had the highest 24-hour average PM10 impacts. The stack parameters and emission rates for these operating conditions were used in the refined modeling analyses to evaluate the modeled impacts of the entire project for each pollutant and averaging period.

Because the emergency generator and fire pump will not be operated during the same 24-hour period, these units were also screening to determine which had the higher impacts for each pollutant during each averaging period. The generator screening analysis showed that the emergency generator had higher impacts for all pollutants except SO_2; because of its higher SO_2 emission rate, the fire pump had higher SO_2 impacts. The unit with higher modeled impacts was modeled during the appropriate averaging period. Both units were included in the assessment of annual impacts. The results of the generator screening analysis are shown in Appendix 8.1B, Table 8.1B-4.

The screening analyses included simple, intermediate, and complex terrain. Terrain features were taken from USGS DEM data and 7.5 minute quadrangle maps of the area. For the screening analysis, a coarse Cartesian grid of receptors spaced at 180 meters was used with a finer downwash grid, spaced at 30 meters, around the EAEC fenceline. The coarse grid extended over 16 kilometers from EAEC in all directions; the downwash grid extended 1200 meters beyond the fenceline.

Refined Air Quality Impact Analysis. The operating conditions and emission rates used to model EAEC are summarized in Table 8.1-23. As discussed above, the turbine stack parameters for Case M were used in modeling the impacts for all except 24-hour averaging periods, while stack parameters for Cases D and K were used in modeling 24-hour average impacts for SO_2 and PM_{10}, respectively. The complete modeling input for each pollutant and averaging period is shown in Appendix 8.1B, Table 8.1B-5.

TABLE 8.1-23
ISCST3 Model Input Data: Source Characteristics for Refined Modeling (emissions in grams per second)

Unit	NO_x	SO_2	CO	PM_{10}
One-Hour Average				
Turbine/Duct Burner 1	2.89	0.225	4.22	N/A
Turbine/Duct Burner 2	2.89	0.225	4.22	N/A
Turbine/Duct Burner 3	2.89	0.225	4.22	N/A
Auxiliary Boiler	0.181	1.14×10^{-2}	0.63	N/A
Emergency Generator	0.82	N/A	0.85	N/A
Fire Pump	N/A	1.59×10^{-2}	N/A	N/A
Cooling Tower (19 cells)	N/A	N/A	N/A	N/A
Three-Hour Average				
Turbine/Duct Burner 1	N/A	0.225	N/A	N/A
Turbine/Duct Burner 2	N/A	0.225	N/A	N/A
Turbine/Duct Burner 3	N/A	0.225	N/A	N/A
Auxiliary Boiler	N/A	1.14×10^{-2}	N/A	N/A
Emergency Generator	N/A	N/A	N/A	N/A
Fire Pump	N/A	5.29×10^{-3}	N/A	N/A
Cooling Tower (19 cells)	N/A	N/A	N/A	N/A
Eight-Hour Average				
Turbine/Duct Burner 1	N/A	N/A	42.24	N/A
Turbine/Duct Burner 2	N/A	N/A	42.24	N/A
Turbine/Duct Burner 3	N/A	N/A	42.24	N/A
Auxiliary Boiler	N/A	N/A	0.63	N/A
Emergency Generator	N/A	N/A	0.107	N/A
Fire Pump	N/A	N/A	N/A	N/A
Cooling Tower (19 cells)	N/A	N/A	N/A	N/A
24-Hour Average				
Turbine/Duct Burner 1	N/A	0.13	N/A	1.39
Turbine/Duct Burner 2	N/A	0.13	N/A	1.39
Turbine/Duct Burner 3	N/A	0.13	N/A	1.39
Auxiliary Boiler	N/A	3.79×10^{-3}	N/A	0.114
Emergency Generator	N/A	N/A	N/A	2.72×10^{-3}
Fire Pump	N/A	6.61×10^{-4}	N/A	N/A
Cooling Tower (19 cells)	N/A	N/A	N/A	1.59×10^{-2}
Annual Average				
Turbine/Duct Burner 1	2.50	0.204	N/A	1.92
Turbine/Duct Burner 2	2.50	0.204	N/A	1.92
Turbine/Duct Burner 3	2.50	0.204	N/A	1.92
Auxiliary Boiler	6.47×10^{-2}	3.45×10^{-3}	N/A	0.12
Emergency Generator	1.86×10^{-2}	2.58×10^{-5}	N/A	1.49×10^{-3}
Fire Pump	6.27×10^{-3}	1.81×10^{-4}	N/A	2.66×10^{-4}
Cooling Tower (19 cells)	N/A	N/A	N/A	1.59×10^{-2}

The model receptor grids were derived from thirty-meter DEM data. Initially, a 180-meter coarse grid was extended to 16.5 kilometers from EAEC in all directions. A 30-meter resolution downwash receptor grid was used within approximately 1.2 km of the site. Thirty-meter refined receptor grids were used in areas where the coarse grid analyses indicated modeled maxima for each site plan would be located. A map showing the layout of each modeling grid around the site plan is presented in Figure 8.1-18.

Specialized Modeling Analyses.

Fumigation Modeling. Fumigation occurs when a stable layer of air lies a short distance above the release point of a plume and unstable air lies below. Under these conditions, an exhaust plume may be drawn to the ground, causing high ground-level pollutant concentrations. Although fumigation conditions rarely last as long as one hour, relatively high ground-level concentrations may be reached during that time.

The SCREEN3 model was used to evaluate maximum ground-level concentrations for short-term averaging periods (24 hours or less). Guidance from the BAAQMD staff[5] and USEPA[6] were followed in evaluating fumigation impacts. Since SCREEN3 is a single-source model, each source was modeled separately. The maximum fumigation impact from the HRSG stacks occurred approximately 13.4 km from the facility, while the maximum fumigation impact from the auxiliary boiler occurred much closer to the site (3.4 km away). The other combustion sources were modeled under F stability, 1 meter/second wind speed at these distances meters and the calculated impacts for all sources were added together in each case to determine total impacts under fumigation conditions. This analysis, which is shown in more detail in Appendix 8.1B, Table 8.1B-5, showed that impacts under fumigation conditions are expected to be lower than the maximum concentrations calculated by ISC under downwash conditions.

Turbine Startup. Facility impacts were also modeled during the startup of one turbine to evaluate short-term impacts under startup conditions. Emission rates used for this scenario were based on an engineering analysis of available data, which included source test data from startups of the gas turbine at the Crockett Cogeneration Project. A summary of the data evaluated in developing these emission rates was shown in Appendix 8.1A, Tables 8.1A-7a and 8.1A-7b. At the request of the Energy Commission staff, turbine exhaust parameters for the minimum operating load point (70 percent) were used to characterize turbine exhaust during startup and a maximum one-hour NOx emission rate of 240 lb/hr was used. The other two turbines were modeled using emissions rates and stack parameters for Case M (demonstrated in the screening analysis to result in the highest modeled impacts for these short-term averaging periods). Startup impacts were evaluated for the one-hour averaging period using ISCST3. Emission rates and stack parameters used in the startup modeling analysis are shown in Table 8.1-24. Results are summarized in Appendix 8.1B, Table 8.1B-6.

TABLE 8.1-24
Emission Rates and Stack Parameters Used in Modeling Analysis for Startup Emissions Impacts

	Value	
Parameter	**1 Turbine in Startup**	**2 Turbines at Max. Load**
Turbine stack temperature (deg K)	330.2	330.2
Turbine exhaust velocity (m/s)	12.76	16.67
One-hour average impacts		
NO_x emission rate (g/s)	30.24	2.89
SO_2 emission rate (g/s)	0.115	0.225
CO emission rate (g/s)	113.65	4.22

[5] BAAQMD draft comments on Calpine's September 21, 1998, modeling protocol for the Delta Energy Center Project, dated October 22, 1998.

[6] USEPA-454/R-92-019, "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised."

Ozone Limiting. With approval from the BAAQMD staff, one-hour NO_2 impacts were modeled using ISC3_OLM (Industrial Source Complex, Version 3, Ozone Limiting Method) Model (version 96113). While this version of ISCST3 is not based on the latest model ISCST3 update, this modeling analysis does not include any features (such as area sources or pit retention) that were affected by recent model updates.

ISC3_OLM uses hourly ozone data to perform ozone-limiting calculations on individual plumes on an hour-by-hour basis. In accordance with guidance provided by the BAAQMD staff, the concurrent ozone data collected at the nearest monitoring station to EAEC, Tracy Patterson Pass, was used for this analysis.

Missing hours in the ozone data set were filled in using linear interpolation if the period of missing data was 2 hours or less. If the data were missing for 3 or more hours, an average of the ozone data during the corresponding time periods during the rest of the same month was used to fill in the missing hours.

Turbine Commissioning. There are two high emissions scenarios possible during commissioning. The first would be the period prior to SCR system and oxidation catalyst installation, when the combustor is being tuned. Under this scenario, NO_x emissions would be high because the NO_x emissions control system would not be functioning and because the combustor would not be tuned for optimum performance. CO emissions would also be high because combustor performance would not be optimized and the CO emissions control system would not be functioning; however, CO emissions would not be expected to exceed levels analyzed under startup conditions.

The second high emissions scenario would occur when the combustor had been tuned but the SCR installation was not complete, and other parts of the turbine operating system were being checked out. This is likely to occur under transient conditions, characterized by 70 percent load operation. Since the combustor would be tuned but the control system installation would not be complete, CO levels would not be expected to be elevated above startup levels but NO_x levels would again be high. Therefore, this analysis was limited to ambient NO_2 impacts during commissioning.

Preconstruction Monitoring. To ensure that the impacts from EAEC will not cause or contribute to a violation of an ambient air quality standard or an exceedance of a PSD increment, an analysis of the existing air quality in the area of EAEC is necessary. BAAQMD rules require preconstruction ambient air quality monitoring data for the purposes of establishing background pollutant concentrations in the impact area (Regulation 2-2-414.3). However, a facility may be exempted from this requirement if the predicted air quality impacts of the facility do not exceed the *de minimis* levels listed in Table 8.1-25.

TABLE 8.1-25
BAAQMD PSD Preconstruction Monitoring Exemption Levels

Pollutant	Averaging Period	*De minimis* Level
CO	8-hr average	575 $\mu g/m^3$
PM_{10}	24-hr average	10 $\mu g/m^3$
NO_2	Annual average	14 $\mu g/m^3$
SO_2	24-hr average	13 $\mu g/m^3$

A facility may, with the District's approval, rely on air quality monitoring data collected at District monitoring stations to satisfy the requirement for preconstruction monitoring. In such a case, in accordance with Section 2.4 of the USEPA PSD guideline, the last three years of ambient monitoring data may be used if they are representative of the area's air quality where the maximum impacts occur due to the proposed source.

The background data need not be collected on site, as long as the data are representative of the air quality in the subject area (40 CFR 51, Appendix W, Section 9.2). Three criteria are applied in determining whether the background data are representative: (1) location, (2) data quality, and (3) data currentness.[7] These criteria are defined as follows:

- Location: The measured data must be representative of the areas where the maximum concentration occurs for the proposed stationary source, existing sources, and a combination of the proposed and existing sources.
- Data quality: Data must be collected and equipment must be operated in accordance with the requirements of 40 CFR Part 58, Appendices A and B, and PSD monitoring guidance.
- Currentness: The data are current if they have been collected within the preceding three years and they are representative of existing conditions.

All of the data used in this analysis meet the requirements of Appendices A and B of 40 CFR Part 58, and thus all meet the criterion for data quality. All of the data have been collected within the preceding three years, and thus all meet the criterion for currentness. The locations of the data sets used to represent background concentrations of each pollutant are discussed individually below.

NO_2. Ambient NO_2 data have been collected at the Tracy Patterson Pass monitoring station since 1995. The Patterson Pass monitoring station is located approximately 7 km south-southeast of the project site. Local meteorological data demonstrate that the monitoring station is upwind of the project site under most meteorological conditions. These winds tend to bring air from the densely populated Livermore Valley through the Altamont and Patterson Passes and into the northern end of the San Joaquin Valley. As the project area itself is sparsely populated, there are few sources of air pollution (other than vehicle traffic) to affect air quality there. The NO_2 levels monitored at the Tracy Patterson Pass monitoring station reflect regional NO_2 concentrations in the vicinity of the project, and thus meet the criterion for location.

SO_2. The nearest ambient SO_2 monitor to the project is in Fresno, and SO_2 monitoring there was terminated in 1997. Fresno is far more populated and developed than the relatively rural and undeveloped project area, so even the extremely low measured SO_2 concentrations in Fresno are expected to overestimate background SO_2 levels there. Therefore, the Fresno SO_2 data provide a conservatively high background concentration for assessing the impacts of the project, and thus meet the location criterion.

CO and PM_{10}. The nearest monitoring station that records CO and PM_{10} is located at Old First Street in Livermore, approximately 21 km southwest of the project site. Livermore is far

[7] Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), USEPA, 1987.

more populated and developed that the rural project area, so the CO data collected at Old First Street conservatively overestimate CO concentrations in the project area.

Local meteorological data demonstrate that the monitoring station is upwind of the project site under most meteorological conditions. These winds tend to bring air from the densely populated Livermore Valley through the Altamont and Patterson Passes and into the northern end of the San Joaquin Valley. As the project area itself is sparsely populated, there are few sources of air pollution (other than fugitive dust sources) to affect air quality there. The CO and PM_{10} levels monitored at the Livermore Old First Street monitoring station reflect regional CO and PM_{10} concentrations in the vicinity of the project, and thus meet the criterion for location.

Results of the Ambient Air Quality Modeling Analyses. The maximum facility impacts calculated from each of the modeling analyses described above are summarized in Table 8.1-26 below. The highest 1-hour average CO impacts are expected during turbine startup. The results of the fumigation modeling analysis are summarized in Appendix 8.1B, Table 8.1B-7.

TABLE 8.1-26
Summary of Results from Refined Modeling Analyses

		Modeled Concentration (µg/m^3)		
Pollutant	**Averaging Time**	**ISCST3**	**Fumigation**	**Startup**
NO_2	1-hour	236.2[a,c]	64	104.7[a]
	Annual	0.6[b]	n/a	n/a
SO_2	1-hour	20.0	1.5	1.9
	3-hour	3.0	1.4	n/a
	24-hour	0.48	n/a	n/a
	Annual	0.03	n/a	n/a
CO	1-hour	581.8	73	689.8
	8-hour	179.7	n/a	n/a
PM_{10}	24-hour	6.6	n/a	n/a
	Annual	0.6	n/a	n/a

Notes: [a] Modeled using ISC_OLM with concurrent ozone data.
[b] Modeled annual NOx corrected to NO_2 using ARM default value of 0.75.
[c] Worst-case one-hour NO_2 impacts are dominated by the emergency generator, which will be operated for testing purposes only one hour per week. Worst-case hourly average NO_2 impacts during other periods will be only 28.3 ug/m^3.

Preconstruction monitoring was not required because the maximum ambient impacts do not exceed *de minimis* levels, as shown in Table 8.1-27.

TABLE 8.1-27
Evaluation of Preconstruction Monitoring Requirements

Pollutant	**Averaging Time**	**Exemption Con-centration (µg/m^3)**	**Maximum Modeled Concentration (µg/m^3)**	**Monitoring Required?**
NO_x	annual	14	0.6	no
SO_2	24-hr	13	0.5	no
CO	8-hr	575	179.7	no
PM_{10}	24-hr	10	6.6	no

Impacts During Turbine Commissioning. As discussed above, there are two potential scenarios under which NO_2 impacts could be higher than under other operating conditions already evaluated.

Scenario 1: Under this scenario, NO_x emissions can be conservatively estimated to be twice the guaranteed turbine-out level of 25 ppmvd @ 15 percent O_2, or 50 ppm. If operation under this condition were to continue for one hour, maximum hourly NO_x emissions at full load would be (50 ppm/2.5 ppm) * 17.19 lbs/hr = 343.8 lbs/hr.

Scenario 2: Under these lower load conditions, NO_x emissions could be as high as 100 ppm @ 15 percent O_2. Based on the transient nature of the loads, the average fuel consumption would be expected to be equivalent to half the full load flow rate, or 949.4 MMBtu/hr. Worst-case hourly NO_x emissions under this scenario would be (100 ppm/2.5 ppm) *8.6 lbs/hr = 343.8 lbs/hr.

As the maximum hourly emissions under each scenario are expected to be the same, the maximum modeled NO_2 impact will occur under the turbine operating conditions that are less favorable for dispersion. These conditions are expected to occur at 70 percent load, because exhaust mass flow and thus final plume rise are lower than at full load.

An ISC_OLM modeling analysis using a NO_x emission rate of 43.32 g/s (343.8 lb/hr) and the appropriate 70 percent load stack parameters indicates that the maximum modeled one-hour NO_2 impact during commissioning is not expected to exceed 127.2 $\mu g/m^3$. This is lower than the maximum modeled one-hour NO_2 impact from the facility as a whole, as shown in Table 8.1-25. Using the background NO_2 concentration of 149 $\mu g/m^3$, the total impact will not exceed 276.2 $\mu g/m^3$, which is well below the state one-hour NO_2 standard of 470 $\mu g/m^3$.

Ambient Air Quality Impacts. To determine a project's air quality impacts, the modeled concentrations are added to the maximum background ambient air concentrations and then compared to the applicable ambient air quality standards. The modeled concentrations have already been presented in earlier tables. The maximum background ambient concentrations are listed in the following text and tables. A detailed discussion of why the data collected at these stations are representative of ambient concentrations in the vicinity of the project was provided above.

Table 8.1-28 presents the maximum concentrations of NO_x, SO_2, CO and PM_{10} recorded for 1997 through 1999 from the Tracy Patterson Pass, Fresno First Street, and Livermore Old First Street stations, respectively.

Maximum ground-level impacts due to operation of EAEC are shown together with the ambient air quality standards in Table 8.1-29. Using the conservative assumptions described earlier, the results indicate that EAEC will not cause or contribute to violations of any state or federal air quality standards, with the exception of the state PM_{10} standard. For this pollutant, existing concentrations already exceed the state standard.

TABLE 8.1-28
Maximum Background Concentrations, 1997-1999 (µg/m^3)

Pollutant	Averaging Time	1997	1998	1999
Tracy, 24371 Patterson Pass Road				
NO_2	1-Hour	113	149	139
	8-Hour	23	25	28
Fresno (1st Street)				
SO_2	1-Hour	37	40	16
	24-hour	27	24	8
	Annual	11	5	0
Livermore, Old First Street				
CO	1-Hour	5,257	4,914	5,943
	8-Hour	2,778	2,622	3,233
PM_{10}	24-Hour	61.6	62.3	86.6
	Annual (AAM)[a]	24.3	21.3	25.6
	Annual (AGM)[b]	22.0	19.4	22.6

Notes:
[a]Annual Arithmetic Mean
[b]Annual Geometric Mean

TABLE 8.1-29
Modeled Maximum Project Impacts

Pollutant	Averaging Time	Maximum Facility Impact (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	State Standard (µg/m^3)	Federal Standard (µg/m^3)
NO_2	1-hour [a]	236.2	149	385.2	470	-
	Annual	0.6	28	28.6	-	100
SO_2	1-hour	20.0	40	60.0	650	-
	24-hour	0.5	27	27.5	109	365
	Annual	0.03	11	11.0	-	80
CO	1-hour	689.8	5,943	6,633	23,000	40,000
	8-hour	179.7	3,233	3,413	10,000	10,000
PM_{10}	24-hour	6.6	86.6	93.2	50	150
	Annual[b]	0.6	22.6	23.2	30	-
	Annual[c]	0.6	25.6	26.2	-	50

Notes:
[a] Worst-case one-hour NO_x impacts are dominated by the Diesel fire pump and emergency generator, which will be operated for testing purposes only one hour per week. Worst-case hourly average NO_2 impacts during other periods will be only 28.3 ug/m^3.
[b] Annual Geometric Mean
[c] Annual Arithmetic Mean

PSD Increment Consumption. The Prevention of Significant Deterioration (PSD) program was established to allow emission increases (increments of consumption) that do not result in significant deterioration of ambient air quality in areas where criteria pollutants have not exceeded the National Ambient Air Quality Standards (NAAQS). For the purposes of determining applicability of the PSD program requirements, the following regulatory procedure is used.

- EAEC emissions are evaluated to determine whether the potential increase in emissions will be significant. Because this facility is a new major facility, the level of emissions that requires an analysis of ambient impacts is determined on a pollutant-specific basis. The emissions increases are those that will result from the proposed new equipment. For new facilities that include large gas turbines with fired HRSGs, USEPA considers a

potential increase of 100 tons per year of any of the criteria pollutants to be significant. In this specific case, EAEC is considered a new major source. Table 8.1-30 compares the potential emissions increases with the levels considered significant.

TABLE 8.1-30
Comparison of Emissions Increase with PSD Significant Emissions Levels

Pollutant	Emissions (tons per year)	Significant Emission Levels (tons per year)	Significant?
NO_x	264	100	Yes
SO_2	21	100	No
POC	74	100	No
CO	919	100	Yes
PM_{10}	211	100	Yes

- If an ambient impact analysis is required, the analysis is first used to determine if the impact levels are significant. The determination of significance is based on whether the impacts exceed established significance levels (BAAQMD Rule 2.2-233) shown in Table 8.1-31. If the significance levels are not exceeded, no further analysis is required.

TABLE 8.1-31
BAAQMD PSD Levels of Significance

Pollutant	Averaging Time	Significant Impact Levels	Maximum Allowable Increments
NO_2	1-Hour	19 $\mu g/m^3$	N/A[a]
	Annual	1 $\mu g/m^3$	25 $\mu g/m^3$
SO_2	3-hour	25 $\mu g/m^3$	512 $\mu g/m^3$
	24-Hour	5 $\mu g/m^3$	91 $\mu g/m^3$
	Annual	1 $\mu g/m^3$	20 $\mu g/m^3$
CO	1-Hour	2000 $\mu g/m^3$	N/A
	8-Hour	500 $\mu g/m^3$	N/A
PM_{10}	24-Hour	5 $\mu g/m^3$	30 $\mu g/m^3$
	Annual	1 $\mu g/m^3$	17 $\mu g/m^3$

[a]The significance levels for 1-hour average NO_2 and for 1-hour and 8-hour average CO are BAAQMD levels only; there are no corresponding federal significance levels or PSD increments.

- If the significance levels are exceeded, an analysis is required to demonstrate that the allowable increments will not be exceeded, on a pollutant-specific basis. Increments are the maximum increases in concentration that are allowed to occur above the baseline concentration. These PSD increments are also shown in Table 8.1-31.

Table 8.1-32 shows that EAEC will be a major source of NO_x, CO, and PM_{10}. Emissions of SO_2 and POC from EAEC will be below the 100 ton per year major source threshold. However, since EAEC is considered major for at least one criteria pollutant, PSD review is required for the entire facility.

TABLE 8.1-32
Comparison of Maximum Modeled Impacts and PSD Significance Thresholds

Pollutant	Averaging Time	Maximum Modeled Impacts (µg/m^3)	Significance Threshold (µg/m^3)	Significant?
NO_2	1-Hour	236.3	19	yes
	Annual	0.6	1	no
SO_2	3-Hour	3.0	25	no
	24-Hour	0.5	5	no
	Annual	0.03	1	no
CO	1-Hour	689.8	2000	no
	8-Hour	179.7	500	no
PM_{10}	24-Hour	6.6	5	yes
	Annual	0.6	1	no

The maximum modeled impacts from EAEC are compared with the significance levels in Table 8.1-32 above. These comparisons show that EAEC exceeds the BAAQMD 1-hour average NO_2 significance level and the 24-hour average PM_{10} significance threshold. Since the 24-hour average PM_{10} impacts exceed the PSD significance level, an increments analysis will be performed for this pollutant and averaging period to demonstrate that this project plus other increment-consuming sources in the area will not cause an exceedance of the allowable federal PM_{10} increment. A protocol for performing the PM_{10} increment analysis is included as Appendix 8.1C. The area over which the 24-hour average PM_{10} significance level is exceeded, called the impact area, is shown in Figure 8.1-19.

8.1.5.2 Screening Health Risk Assessment

The screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the noncriteria pollutant emissions from the facility. The SHRA was conducted in accordance with the CAPCOA *Air Toxics "Hot Spots' Program Revised 1992, Risk Assessment Guidelines*" (October 1993) and the Bay Area Air Quality Management District "Risk Management Procedure" Policy (May 1991). The SHRA estimated the offsite cancer risk to the maximally exposed individual (MEI), as well as indicated any adverse effects of non-carcinogenic compound emissions. The CARB/OEHHA Health Risk Assessment computer program was used to evaluate multipathway exposure to toxic substances. Because of the conservatism (overprediction) built into the established risk analysis methodology, the actual risks will be lower than those estimated.

A health risk assessment requires the following information:

- Unit risk factors (or carcinogenic potency values) for any carcinogenic substances that may be emitted;
- Noncancer Reference Exposure levels (RELs) for determining non-carcinogenic health impacts;
- One-hour and annual average emission rates for each substance of concern; and
- The modeled maximum offsite concentration of each of the pollutants emitted.

Pollutant-specific unit risk factors are the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 µg/m^3 over a 70-year lifetime. The SHRA uses unit risk factors specified by the California Office of

Environmental Health Hazard Assessment (OEHHA). The cancer risk for each pollutant emitted is the product of the unit risk factor and the modeled concentration. All of the pollutant cancer risks are assumed to be additive.

An evaluation of the potential noncancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. Many of the carcinogenic compounds are also associated with noncancer health effects and are therefore included in the determination of both cancer and noncancer effects. RELs are used as indicators of potential adverse health effects. RELs are generally based on the most sensitive adverse health effect reported and are designed to protect the most sensitive individuals. However, exceeding the REL does not automatically indicate a health impact. The OEHHA reference exposure levels were used to determine any adverse health effects from noncarcinogenic compounds. A hazard index for each noncancer pollutant is then determined by the ratio of the pollutant annual average concentration to its respective REL for a chronic evaluation. The individual indices are summed to determine the overall hazard index for the project. Because noncancer compounds do not target the same system or organ, this sum is considered conservative. The same procedure is used for the acute evaluation.

EAEC SHRA results are compared with the established risk management procedures for the determination of acceptability. The established risk management criteria include those listed below.

- If the potential increased cancer risk is less than one in a million, the facility risk is considered not significant.
- If the potential increased cancer risk is greater than one in a million but less than ten in a million and Toxics-Best Available Control Technology (TBACT) has been applied to reduce risks, the facility risk is considered acceptable.
- If the potential increased cancer risk is greater than ten in a million and there are mitigating circumstances that, in the judgment of a regulatory agency, outweigh the risk, the risk is considered acceptable.
- For noncancer effects, total hazard indices of one or less are considered not significant.
- For a hazard index greater than one, OEHHA and the reviewing agency conduct a more refined review of the analysis and determine whether the impact is acceptable.

The SHRA includes the noncriteria pollutants listed above in Table 8.1-22. The receptor grid described earlier for criteria pollutant modeling was used for the SHRA. The only sensitive receptor identified within a 3-mile radius of the proposed plant site was Mountain House School, 1.9 km south of the plant on Mountain House Road.

The SHRA results for EAEC are presented in Table 8.1-33, and the detailed calculations are provided in Appendix 8.1D. The locations of the maximum modeled risks are shown in Figure 8.1D-1.

TABLE 8.1-33
Screening Health Risk Assessment Results

Cancer Risk to Maximally Exposed Individual	0.19 in one million
Acute Inhalation Hazard Index	0.14
Chronic Inhalation Hazard Index	0.086
Chronic Noninhalation Exposure	Max. Dose/REL = 8.5E-6

The screening HRA results indicate that the acute and chronic hazard indices are well below 1.0, so are not significant. In addition, the maximum chronic noninhalation exposure is well below the REL so is also considered insignificant. The cancer risk to a maximally exposed individual is 0.19 in one million, well below the 1 in one million level. The screening HRA results indicate that, overall, EAEC will not pose a significant health risk at any location. Risks to sensitive receptors beyond the 3-mile search radius will be even lower than the values summarized in Table 8.1-33.

A risk screening analysis was also performed to demonstrate that the Diesel fire pump engine will not cause a significant carcinogenic risk at any offsite location. The maximum modeled cancer risk from the fire pump engine is 0.9 in one million, below the 1 in one million significance level. Therefore the fire pump is an exempt unit for District permitting.

8.1.5.3 Visibility Screening Analysis

A screening mode of the ISCST3 model was run for EAEC to determine potential visibility impacts to protected areas in the vicinity of the project, specifically, the Point Reyes National Seashore and the Pinnacles National Monument. The modeling followed screening guidance as provided by the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and the Final Federal Land Managers' Air Quality Related Values Workgroup (FLAG).

ISCST3 was used with two years of hourly meteorology from the Tracy site described earlier and assumed flat terrain, in accordance with Park Service guidance. One receptor was placed at the closest location to each Class I boundary (107 km away at Point Reyes; 145 km away at Pinnacles). Based on National Park Service Guidance, the VISCREEN model was not used to assess coherent plume visibility impacts as the distance to each of the Class I areas is greater than 50 kilometers.

To assess visibility impacts at Point Reyes and Pinnacles, the mean best 20 percent background visual range was used, which corresponded to a background extinction coefficient of 26.82 inverse Megameters (Mm^{-1}) and 24.07 Mm^{-1}, respectively. The background extinction coefficients correspond to a background visual range of 145.9 kilometers for Point Reyes National Seashore and 162.5 kilometers for Pinnacles National Monument. The relative humidity correction factor (f(RH)) was 3.0 for Point Reyes and 2.40 for Pinnacles. John Vimont of the National Park Service provided both values. The allowable level of acceptable change (LAC) to extinction is 5 percent.

Emissions. As stated earlier, the combustion sources at the proposed project will utilize advanced NO_x control technology and natural gas fuel to achieve very low emission rates. Emissions from the project include NO_x, SO_2, and PM_{10}, all of which have the potential to interfere with visibility. Emissions used in the ISCST3 modeling analysis of visibility

impacts are the same as those used for the criteria pollutant modeling analysis. The parameters modeled for the visibility impacts assume that the particulate nitrate (NO_3-) is in the form of ammonium nitrate (NH_4NO_3) and that particulate sulfate (SO_4-) is in the form of ammonium sulfate ($(NH_4)2SO_4$). The visibility calculation is based on the ambient concentrations of NH_4NO_3, $(NH_4)2SO_4$, and PM_{10} along with a representative relative humidity adjustment factors.

Impacts. The maximum 24-hour visibility impact was generated by taking the maximum 24-hour average modeled concentration at each receptor, regardless of the season in which it occurred, and assigning it to represent the visibility impact at Point Reyes and Pinnacles. A 40 percent nitrate conversion rate was assumed to persist for all seasons.

To calculate extinction coefficients, the following general equation was used:

$$b_{ext} = b_{SN} * f(RH) + b_{dry}$$

where:

b_{ext} = particle scattering coefficient
b_{SN} = $3[((NH_4)2SO_4) + (NH_4NO_3)]$
b_{dry} = b_{Coarse}

The quantities in brackets are the masses expressed in $\mu g/m^3$ and can further be broken down into the following equations:

b_{NO3} = $3[1.29(NO_3)f(RH)]$
b_{SO4} = $3[1.375(SO_4)f(RH)]$
b_{Coarse} = $0.6[PM_{10}]$

The concentration data are summarized in Table 8.1-34.

TABLE 8.1-34
Maximum Predicted Concentrations of Nitrates, Sulfates and Fine Particulates

Class I Area	NO_3 ($\mu g/m^3$)	SO_4 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
Point Reyes	0.0566	0.01278	0.13108
Pinnacles	0.0349	0.00721	0.07397

Using the above equations to calculate the extinction coefficients and correcting for $f(RH)$ = 3.0 (for Point Reyes) and $f(RH)$ = 2.4 (for Pinnacles) (except for b_{Coarse}, which is not corrected), Table 8.1-35 summarizes the maximum extinction coefficients for each year for each pollutant and the total extinction.

TABLE 8.1-35
Maximum Modeled Impacts in Protected Areas

Class I Area	b_{NO3} (Mm^{-1})	b_{SO4} (Mm^{-1})	b_{Coarse} (Mm^{-1})	24-hour Average Visibility Impact (Mm^{-1})	Percent Change in Extinction
Point Reyes	0.6571	0.1582	0.0786	0.8939	3.33
Pinnacles	0.3239	0.0714	0.0444	0.4397	1.83

Thus, during operation of the proposed project, potential visibility impacts to Point Reyes National Seashore and Pinnacles National Monument will not be greater than the 5 percent level of acceptable change.

8.1.5.4 Construction Impacts Analysis

Emissions due to the construction phase of the project have been estimated, including an assessment of emissions from vehicle and equipment exhaust and the fugitive dust generated from material handling. A dispersion modeling analysis was conducted based on these emissions. A detailed analysis of the emissions and ambient impacts is included in Appendix 8.1E. The results of the analysis indicate that the maximum construction impacts will be below the state and federal standards for all the criteria pollutants emitted. The best available emission control techniques will be used. The EAEC construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards.

Combustion Diesel PM_{10} emission impacts have also been evaluated to demonstrate that the carcinogenic risk from construction activities will be below one in one million. This risk screening analysis is also included in Appendix 8.1D.

8.1.6 Consistency with Laws, Ordinances, Regulations, and Standards

8.1.6.1 Consistency with Federal Requirements

The Bay Area Air Quality Management District (District) has been delegated authority by the USEPA to implement and enforce most federal requirements that are applicable to EAEC, including the new source performance standards and PSD review for all pollutants. Compliance with the District regulations ensures compliance and consistency with the corresponding federal requirements as well. EAEC will also be required to comply with the Federal Acid Rain requirements (Title IV). Since the District has received delegation for implementing Title IV through its Title V permit program, EAEC will secure a District Title V permit that imposes the necessary requirements for compliance with the Title IV Acid Rain provisions.

8.1.6.2 Consistency with State Requirements

State law sets up local air pollution control districts and air quality management districts with the principal responsibility for regulating emissions from stationary sources. As discussed above, EAEC is under the local jurisdiction of the District, and compliance with District regulations will ensure compliance with state air quality requirements.

8.1.6.3 Consistency with Local Requirements: Bay Area Air Quality Management District (District)

The District has been delegated responsibility for implementing local, state, and federal air quality regulations in the nine counties surrounding the Bay Area. EAEC is subject to District regulations that apply to new sources of emissions, to the prohibitory regulations that specify emission standards for individual equipment categories, and to the requirements for evaluation of impacts from toxic air pollutants. The following sections include the evaluation of facility compliance with the applicable District requirements.

Under the regulations that govern new sources of emissions, EAEC is required to secure a preconstruction Determination of Compliance from the District (Regulation 2, Rule 3), as well as demonstrate continued compliance with regulatory limits when EAEC becomes operational. The preconstruction review includes demonstrating that EAEC will use best available control technology (BACT) and will provide any necessary emission offsets.

Applicable BACT levels are shown in Table 8.1-36, along with anticipated potential facility emissions. BAAQMD Rule 2-2-301 requires EAEC to apply BACT for emissions of NO_x, POC, SO_x, CO and PM_{10} (criteria pollutants) in excess of 10.0 pounds per highest day. Rule 2.2-301.2 imposes BACT for emissions of lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds when emitted in excess of specified amounts. EAEC will not emit any of these latter pollutants in detectable quantities; therefore, Rule 2-2-301.2 is not applicable to EAEC. As shown in the table, BACT is required for NO_x, POC, SO_2, CO, and PM_{10}. The calculation of facility emissions was discussed in AFC Section 8.1.5.1.

TABLE 8.1-36
Facility Best Available Control Technology Requirements

Pollutant	Applicability Level	Facility Emission Level (lbs/day)	BACT Required?
Criteria Pollutants: District Regulation 2-2-301.1			
POC	10 lbs/day	550	yes
NPOC	10 lbs/day	-	no
NO_x	10 lbs/day	2,327	yes
SO_2	10 lbs/day	121	yes
PM_{10}	10 lbs/day	1,223	yes
CO	10 lbs/day	12,267	yes
Noncriteria Pollutants: District Regulation 2-2-301.2			
Lead	3.2 lbs/day	neg.	no
Asbestos	0.04 lbs/day	neg.	no
Beryllium	0.002 lbs/day	neg.	no
Mercury	0.5 lbs/day	neg.	no
Fluorides	16 lbs/day	neg.	no
Sulfuric Acid Mist	38 lbs/day	neg.	no
Hydrogen Sulfide	55 lbs/day	neg.	no
Total Reduced Sulfur	55 lbs/day	neg.	no
Reduced Sulfur Compounds	55 lbs/day	neg.	no

BACT for the applicable pollutants was determined by reviewing the District BACT Guidelines Manual, the South Coast Air Quality Management District BACT Guidelines Manual, the most recent Compilation of California BACT Determinations, CAPCOA (2nd Ed., November 1993), and USEPA's BACT/LAER Clearinghouse. A summary of the review is provided in Appendix 8.1F. For the gas turbines and duct burners, the District considers BACT to be the most stringent level of demonstrated emission control that is feasible. EAEC will use the BACT measures discussed below.

As a BACT measure, EAEC will limit the fuels burned at EAEC to natural gas, a clean burning fuel. Liquid fuels will not be fired at EAEC except in the emergency Diesel fire pump and emergency generator set. Burning of liquid fuels in the gas turbine combustors

and duct burners would result in greater criteria pollutant emissions than if the units burned only gaseous fuels. This measure acts to minimize the formation of all criteria air pollutants.

BACT for NO_x emissions from the gas turbine will be the use of low NO_x emitting equipment and add-on controls. EAEC has selected a gas turbine equipped with dry low NO_x combustors. The gas turbine dry low NO_x combustors will generate approximately 25 to 35 ppmvd NO_x, corrected to 15 percent O_2. In addition, EAEC will use a selective catalytic reduction (SCR) system to further reduce NO_x emissions to 2.5 ppmvd NO_x, corrected to 15 percent O_2 on a one-hour average basis. Annual average NOx emissions will not exceed 2.0 ppmvd @ 15% O_2 (excluding startups and shutdowns). The District BACT guidelines indicate that BACT from large gas turbines (>23 MMBtu/hr heat input) is an exhaust concentration not to exceed 5 ppmvd NO_x, corrected to 15 percent O_2; therefore, EAEC will meet the BACT requirements for NO_x. The duct burner will also be exhausted to the SCR system; therefore, BACT for the duct burner is also the stringent 2.5 ppmvd NO_x level, corrected to 15 percent O_2. The District BACT Guideline determination for NO_x from gas turbines is shown in Appendix 8.1F.

BACT for NO_x emissions from the auxiliary boiler will be the use of low NO_x emitting equipment and add-on controls. EAEC has selected a boiler equipped with low NO_x burners. The boiler with low NO_x burners will generate approximately 50 ppmvd NO_x, corrected to 3 percent O_2. In addition, EAEC will use a selective catalytic reduction (SCR) system to further reduce NO_x emissions to 9.0 ppmvd NO_x, corrected to 3 percent O_2. The District BACT guidelines indicated that BACT from a boiler ($\geq$ 50 MMBtu/hr heat input) is a NO_x exhaust concentration not to exceed 9 ppmvd, corrected to 3 percent O_2; therefore, EAEC will meet the BACT requirements for NO_x. The District BACT Guideline determination for NO_x from boilers is shown in Appendix 8.1F.

BACT for CO emissions will be achieved by use of gas turbines equipped with dry low NO_x combustors and an oxidation catalyst. Dry low NO_x combustors emit low levels of combustion CO while still maintaining low NO_x formation. In addition, EAEC will use an oxidation catalyst system to further reduce CO emissions to 6.0 ppmvd NO_x, corrected to 15 percent O_2. EAEC has specified a CO limit of 6 ppmvd, corrected to 15 percent O_2, for base load and part load operation. The District BACT guidelines indicate that BACT from large gas turbines (>23 MMBtu/hr heat input) is 10 ppmvd CO, corrected to 15 percent O_2. CO emissions from the EAEC gas turbines will meet the District BACT requirements. The CO emission rate from the gas turbine at the outlet of the exhaust stacks will not exceed 6 ppmvd, corrected to 15 percent O_2 except under startup and shutdown conditions. A review of recent BACT determinations for CO from gas turbines is provided in Appendix 8.1F.

BACT for CO emissions will be achieved by use of an auxiliary boiler equipped with low NOx burners and an oxidation catalyst to reduce CO emissions from 100 ppmvd CO, corrected to 3 percent O_2, to 50 ppmvd, corrected to 15 percent O_2. The District BACT guidelines indicate that BACT for boilers ($\geq$ 50 MMBtu/hr) is 50 ppmvd at 3 percent O_2, therefore EAEC will meet the necessary BACT requirements for CO.

BACT for POC emissions will be achieved by use of the gas turbine dry low NO_x combustors. As in the case of CO emission formation, dry low NO_x combustors use air to fuel ratios that result in low combustion POC while still maintaining low NO_x levels. BACT

for POC emissions from combustion devices has historically been the use of best combustion practices. With the use of the dry low NO_x combustors and with the duct burner emission level, POC emissions leaving the stacks will not exceed 2.0 ppmvd, corrected to 15 percent oxygen. This level of emissions is consistent with recent BACT determinations for similar projects.[8]

BACT for POC emissions for the auxiliary boiler will be achieved by good combustion practices and an oxidation catalyst. The POC emissions are 10 ppmvd, corrected to 3 percent O2. The District BACT guidelines indicate that BACT for boilers ($\geq$ 50 MMBtu/hr) is good combustion practices. The low NOx burners are designed to minimize incomplete combustion and therefore minimize POC emissions.

For the turbines, duct burners and auxiliary boiler, BACT for PM_{10} is best combustion practices and the use of gaseous fuels. As mentioned, use of clean burning natural gas fuel with a sulfur content of 0.25 gr/100 scf will result in minimal particulate emissions. BACT for the cooling tower is the use of high-efficiency drift eliminators with an emission rate of 0.0005 percent. This control efficiency has been proposed by similar projects that have recently been approved.

SO_2 emissions will be kept at a minimum by firing clean burning natural gas fuel with a sulfur content of 0.25 gr/100 scf.

In addition to the BACT requirements, District regulation 2-2-302 requires EAEC to provide full emission offsets when emissions exceed specified levels on a pollutant-specific basis. As shown in Table 8.1-37, EAEC will be required to provide emission offsets for NO_x, PM_{10}, and POC emissions.

TABLE 8.1-37
BAAQMD Offset Requirements and EAEC Emissions

Pollutant	Applicable Facility Size	Emission Increase	EAEC Emission Rate (Permitted Units)	Regulation	Offsets Required
POC	50 tpy	Any increase	73.4 tpy	2-2-302	Yes
NO_x	50 tpy	Any increase	260.9 tpy	2-2-302	Yes
PM_{10}	100 tpy	1 tpy Net increase	211.1 tpy	2-2-303	Yes
SO_2	100 tpy	1 tpy Net increase	21.3 tpy	2-2-303	No

Section 2-302 requires POC and NO_x emission reduction credits to be provided at an offset ratio of 1.15:1. Because both POC and NO_x contribute to the Bay Area Basin ozone levels, Section 2-302.2 allows the use of POC emission reduction credits for NO_x emissions, at the 1.15:1 offset ratio.

Section 2-303 requires emissions offsets for emissions increases at facilities that emit more than 100 tpy of SO_2 and PM_{10}. As facility emissions of SO_2 will be below 100 tpy, SO_2 offsets are not required. However, PM_{10} emissions offsets will be required.

Sections 2-304 and 2-305 impose emissions offset requirements, or require project denial, if SO_2, NO_2, PM_{10}, or CO air quality modeling results indicate emissions will interfere with the

[8] Although the turbines/HRSGs will be equipped with oxidation catalysts, no POC control effectiveness has been assumed.

attainment or maintenance of the applicable ambient air quality standards or will exceed PSD increments. For many of the pollutants and averaging periods, District regulations do not require EAEC to conduct these analyses, since the modeled impacts of the proposed facility are not significant under District rules. However, modeling for these pollutants has been conducted to satisfy CEC requirements. The modeling analyses show that facility emissions will not interfere with the attainment or maintenance of the applicable air quality standards.

Emissions offset requirements for NO_x, POC, and PM_{10} are shown in Table 8.1-38 below. Sufficient offsets are available through the District offset emissions bank and through sources that have not banked emissions with the District, such as facility closures. The District offset bank listing provides the required information for offset identification and assessment of the emission reduction levels achieved.

The information includes:

- Ownership of emission offset sources; and
- Emission reduction credits granted by the District that have been determined to meet the District's requirements for bankable offsets.

TABLE 8.1-38
Facility Offset Requirements

Pollutant	Permitted Emissions (tons/yr)	Required Offset Ratio	Required Offsets (tons/yr)
NO_x	260.9	1.15:1.0	300.0
POC	73.4	1.15:1.0	84.4
PM_{10}	211.0	1.0:1.0	211.0

A current listing of deposits in the offset bank is included in Appendix 8.1G. The applicant has been in contact with facilities with emission reduction credits in the offset bank and is providing a list of the offsets that are expected to be used for this project under separate cover. Because of the highly competitive nature of the offset market, confidential treatment of this offset list is being sought at this stage of the negotiations.

As discussed in AFC Section 5.1.2, Regulatory Setting, the BAAQMD PSD program requirements apply on a pollutant-specific basis to:

- A new major facility that will emit 100 tpy or more, if it is one of the PSD source categories in the federal Clean Air Act, or a new facility that will emit 250 tpy or more; or
- A facility that emits 100 tpy or more, with net emissions increases since the applicable PSD baseline date that exceed the modeling threshold levels shown in Table 8.1-39.

EAEC is a new major source. Therefore, it is subject to the USEPA and District PSD regulations. The District modeling threshold requirements and their applicability to EAEC are shown in Table 8.1-39. The required modeling analysis was carried out and the results presented in Section 8.1.5.1.

TABLE 8.1-39
BAAQMD PSD Requirements Applicable to 100 tpy Fossil Fuel Fired Power Plants

Pollutant	PSD Facility Applicability Level	Modeling Threshold Level	Facility Emissions	Modeling Required	Applicable District Regulation
NO_x	100 tpy	100 tpy	260.9 tpy	Yes	2-2-304.2
SO_2	100 tpy	100 tpy	21.3 tpy	No	2-2-304.2
PM_{10}	100 tpy	100 tpy	211.0 tpy	Yes	2-2-304.3
CO	100 tpy	100 tpy	915.9 tpy	Yes	2-2-305.1
POC	100 tpy	not required	-	-	-

[a]All particulate matter from EAEC is assumed to be emitted as PM_{10}.

As discussed below, the specific District Regulation 2, Rule 2 criteria for conducting modeling analyses have been met.

Rule 2-2-414.1 requires that the modeling be conducted with appropriate meteorological and topographic data necessary to estimate impacts. The EAEC modeling analyses used District-approved U.S. Geological Service topographic data for the surrounding area and District-approved weather data collected at the Tracy meteorological monitoring station approximately nine km southeast of the project site. As discussed above, the meteorological data meet the requirements of USEPA guidance.

Rule 2-2-304 and 2-2-412.2 require a demonstration that emission increases subject to the PSD program will not interfere with the attainment or maintenance of any State or national ambient air quality standards for each applicable pollutant, unless adequate emissions offsets are provided. As shown in Table 8.1-32, EAEC will exceed only the BAAQMD one-hour NO_2 significance level, for which there is no corresponding federal significance level, and the 24-hour PM_{10} PSD significance level. In addition, offsets will be provided for increases in NO_x, POC, and PM_{10} emissions. Therefore, project impacts on state and federal ambient air quality standards are not considered significant. Additionally, the modeling analysis results do not show an exceedance of state or national ambient air quality standards, with the exception of the state 24-hour average PM_{10} standard, which is already being exceeded. The modeling analysis is discussed in detail in Section 8.1.5.1.

For an application that triggers PSD modeling requirements, Rules 2-2-211 and 2-2-413.3 require that ambient monitoring data be gathered for one year preceding the submittal of a complete application, or a District-approved representative time period. However, if the air quality impacts of EAEC do not exceed the specified *de minimis* levels on a pollutant-specific basis, EAEC is exempted from the preconstruction monitoring requirement. The air quality impacts of EAEC's NO_x, CO, SO_2, and PM_{10} emissions were below their respective *de minimis* levels, as shown in Table 8.1-27, and therefore the exemption does apply to the proposed project. The ambient monitoring stations in Tracy, Livermore, and Fresno are representative of existing air quality in the vicinity of the project, and were used to determine existing ambient concentrations.

Rule 2-2-308 requires applicants to demonstrate that emissions from a project located within 10 km (6.2 miles) of a Class I area will not cause or contribute to the exceedance of any national ambient air quality standard or any applicable Class I PSD increment. Because the nearest Class I areas, Point Reyes National Seashore and Pinnacles National Park, are farther than 10 km from EAEC, this section is not applicable to the proposed facility.

Rule 2-2-417 requires an applicant for a permit subject to a PSD air quality analysis to provide additional analysis of the impact of the facility on visibility, soils, and vegetation. The visibility analysis is provided in Section 8.1.5.3. The soils, vegetation and growth analyses are provided in Sections 8.9, 8.2, and 8.4 of the AFC.

Rule 2-2-306 is also not applicable to EAEC. This section requires modeling analyses for specific noncriteria pollutants (lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur and reduced sulfur compounds) if they are emitted in significant quantities and if the facility emits more than 100 tons per year of any criteria pollutant. As EAEC will not emit significant quantities of the specific noncriteria pollutants, a noncriteria pollutant modeling analysis under this section is not required. However, a screening health risk assessment has been conducted for potential emissions of toxic air contaminants. The analysis methodology and results are discussed in Section 8.1.5.2.

Rule 2-2-418 requires the use of Good Engineering Practices (GEP) stack height. Conformance with the GEP stack height requirement was demonstrated in the modeling analysis conducted for EAEC.

Regulation 2, Rule 6, Major Facility Review (Title V permit program), applies to facilities that emit greater than 100 tons per year on a pollutant-specific basis. Under the Title V permit program, EAEC will be required to file an application for an operating permit within 12 months of facility startup. The Phase II acid rain requirements will also apply to EAEC. As a Phase II Acid Rain facility, EAEC will be required to provide sufficient allowances for every ton of SO_2 emitted during a calendar year. EAEC will obtain any necessary allowances on the current open trade market. EAEC will also be required to install and operate continuous monitoring systems; District enforcement of its rules will ensure installation of these systems.

The general prohibitory rules of the District applicable to EAEC and the determination of compliance follow.

Regulation 1-301 addresses Public Nuisance. EAEC will emit insignificant quantities of odorous or visible substances; therefore, EAEC will comply with this regulation.

Regulation 6 pertains to particulate matter and visible emissions. Any visible emissions from the project will not be darker than No. 1 when compared to a Ringlemann Chart for any period(s) aggregating 3 minutes in any hour. Because EAEC will burn clean fuels, the opacity standard of not greater than 20 percent for a period or periods aggregating 3 minutes in any hour and the particulate emission concentrations limit of 0.15 grains per standard cubic feet of exhaust gas volume will not be exceeded.

Regulation 7, Odorous Substances, is not applicable to EAEC. Gas turbine operations do not result in odor complaints.

Regulation 9, Rule 1, Sulfur Dioxide, specifies an emission standard of less than 300 ppm SO_2. Because of the insignificant quantities of sulfur in natural gas, this limit will be achieved. In addition, the ambient air quality modeling analysis discussed in Section 8.1.5.1.2 shows that ground-level concentrations of SO_2 from EAEC will not result in ground-level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

Regulation 9, Rule 2, pertains to hydrogen sulfide. EAEC is not expected to emit H_2S.

Regulation 9, Rule 3, Nitrogen Oxides From Heat Transfer Operations, imposes a NO_x limit of 125 ppm. EAEC will easily comply with this rule.

Regulation 9, Rule 9, limits the emissions of nitrogen oxides from gas turbines during baseload operations to less than 9 ppmv corrected to 15 percent O_2. EAEC's NO_x level of 2.5 ppmvd, corrected to 15 percent O_2, will satisfy the requirements of this rule. In addition, the continuous emission monitoring (CEM) system that EAEC will install will also satisfy the monitoring and recordkeeping requirements of this rule.

Regulation 9, Rule 10, limits hexavalent chromium emissions from cooling towers. Chemicals containing hexavalent chromium will not be used in the EAEC cooling tower; therefore, rule requirements will be met.

District Regulation 10 (40 CFR 60 Subparts Da and GG) adopts by reference the federal New Source Performance Standards (NSPS) for electric utility steam generators and stationary gas turbines. This regulation requires monitoring of fuel; imposes limits on the emissions of NO_x, SO_2, and PM_{10}; and requires source testing of stack emissions, process monitoring, and data collection and recordkeeping. All of the BACT limits imposed on EAEC will be more stringent than the requirements of the NSPS emission limits. Monitoring and recordkeeping requirements for BACT will be more stringent than the requirements in this rule. EAEC will comply with the NSPS regulations.

8.1.7 Cumulative Air Quality Impacts Analysis

An analysis of potential cumulative air quality impacts that may result from EAEC and other reasonably foreseeable projects is generally required only when project impacts are significant.

To ensure that potential cumulative impacts of EAEC and other nearby projects are adequately considered, a cumulative impacts analysis will be conducted in accordance with the protocol included as Appendix 8.1H. This procedure is similar to that which will be used to evaluate increment consumption for the project.

8.1.8 Nitrate Deposition

An analysis of the potential for nitrate deposition impacts from the project is presented in Appendix 8.1I.

8.1.9 Mitigation

Mitigation will be provided for all emissions increases from the project in the form of offsets and the installation of BACT, as required under District regulations. If the cumulative air quality impacts analysis described in Appendix 8.1H shows that the project will result in significant cumulative impacts, additional mitigation will be provided. Mitigation will be provided through the purchase of additional offsets from the District emissions bank.

8.1.10 References

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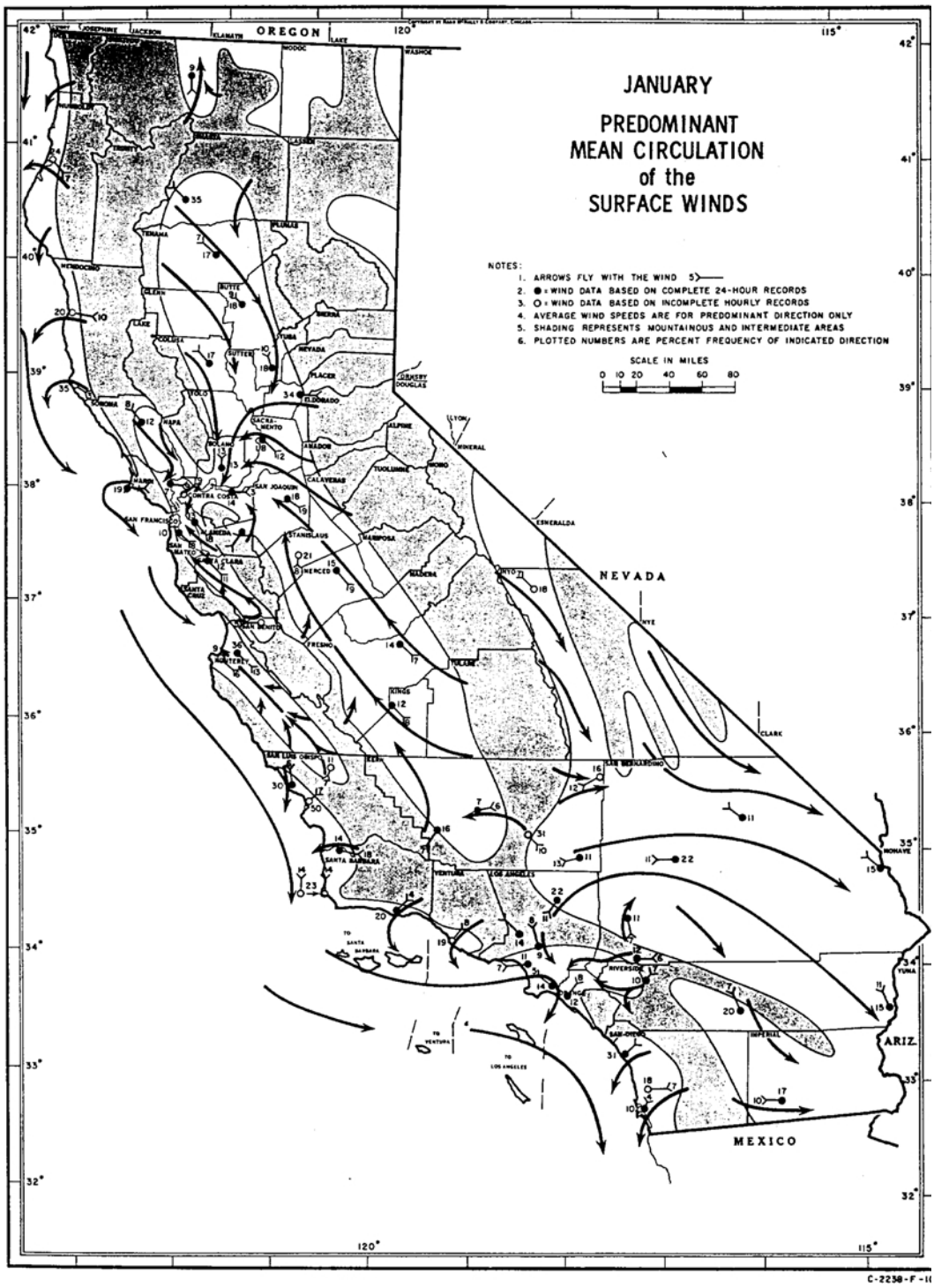


Figure 8.1-1 January Predominant Mean Circulation of the Surface Winds

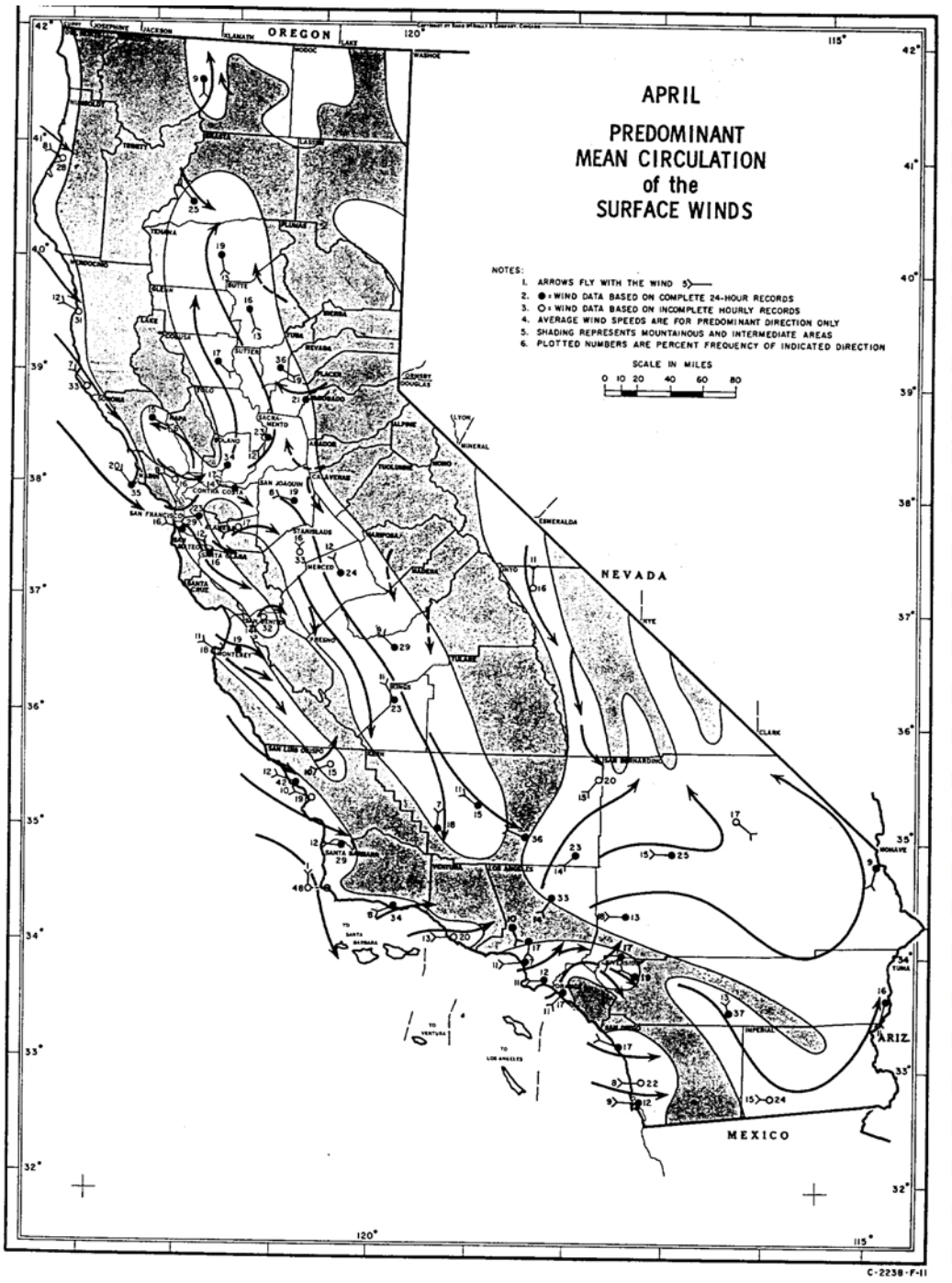


Figure
8.1-2 April Predominant Mean Circulation of the Surface Winds

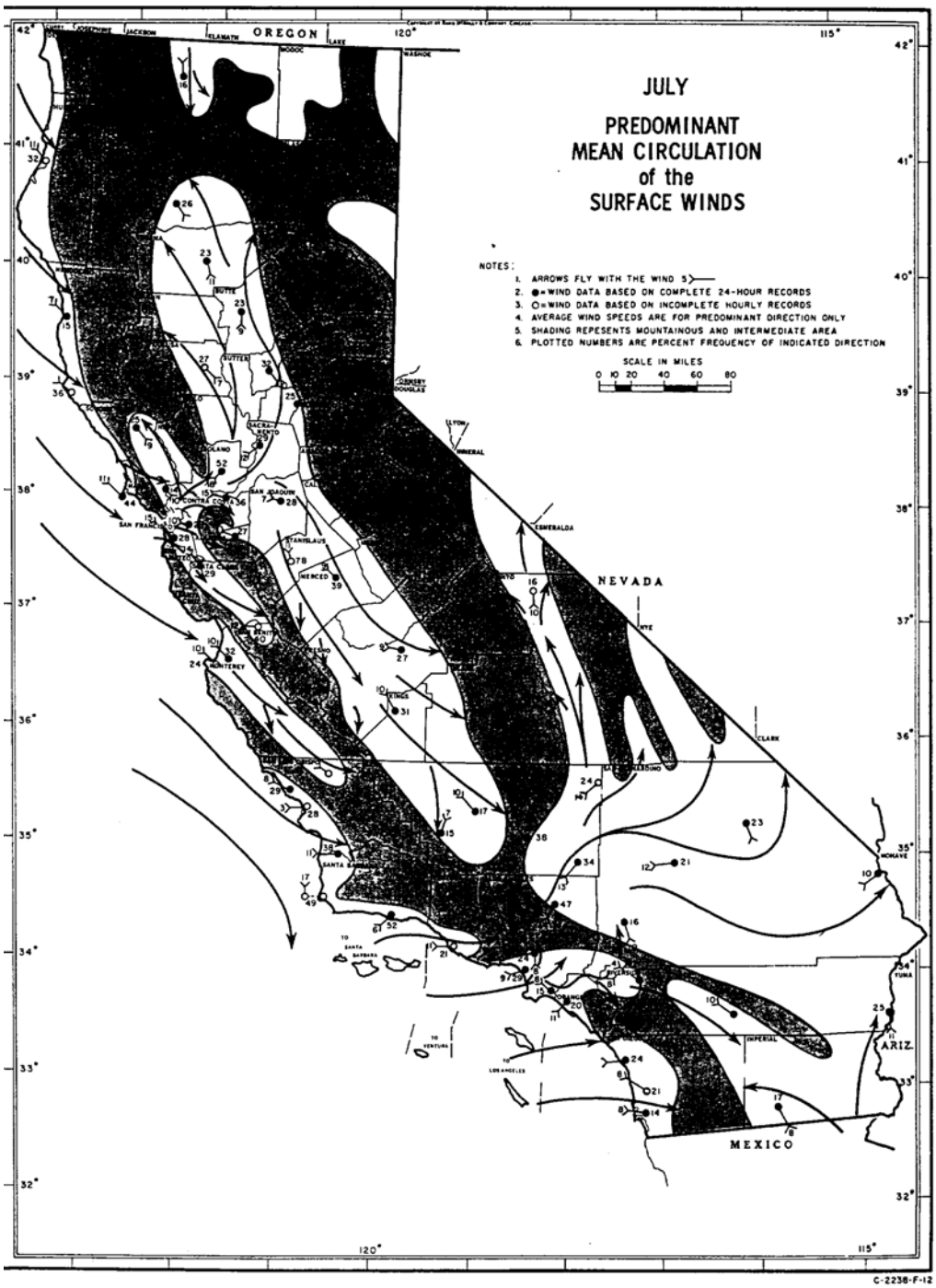


Figure
8.1-3 July Predominant Mean circulation of the Surface Winds

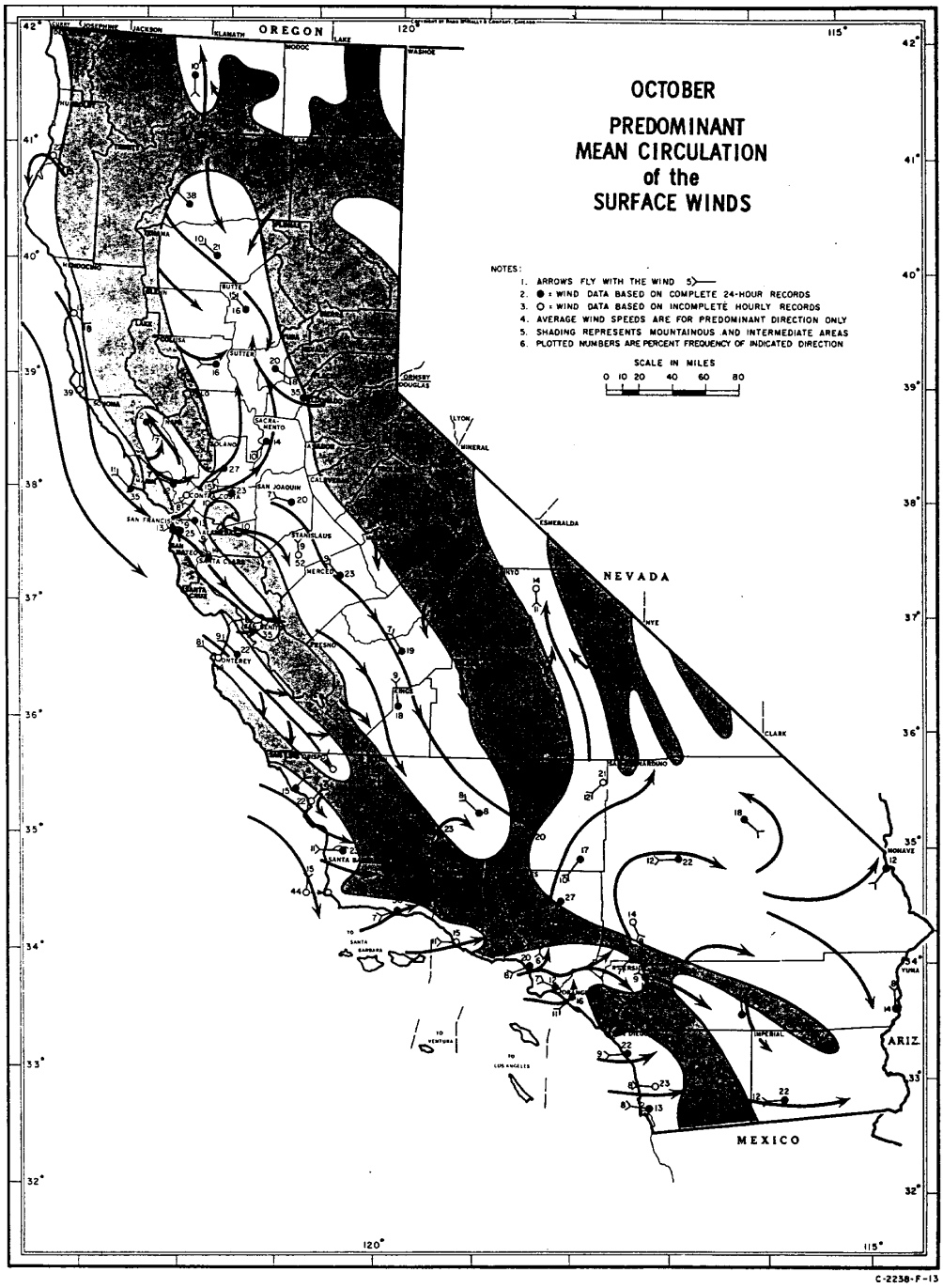
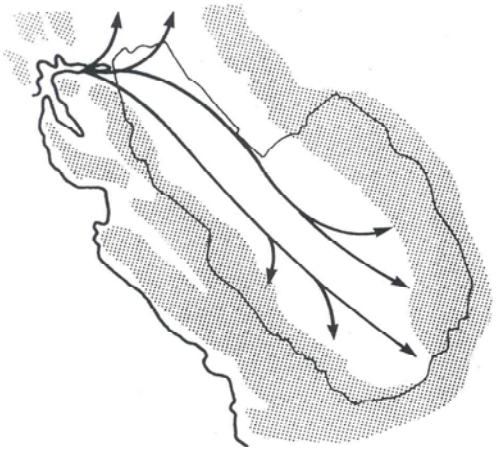
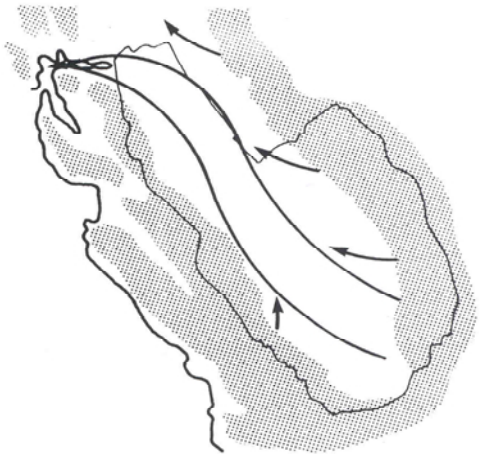


Figure
8.1-4 October Predominant Mean Circulation of the Surface Winds

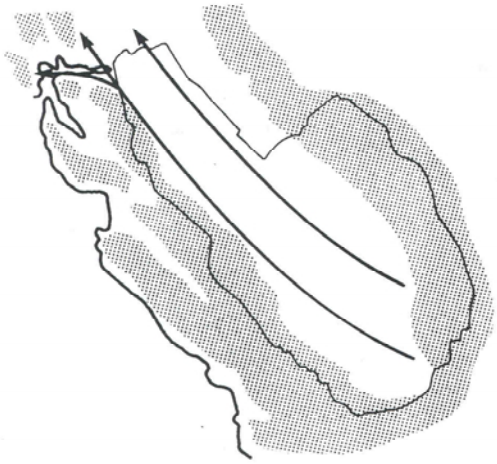
Figure
8.1-5 San Francisco Bay Area Flow Pattern Types



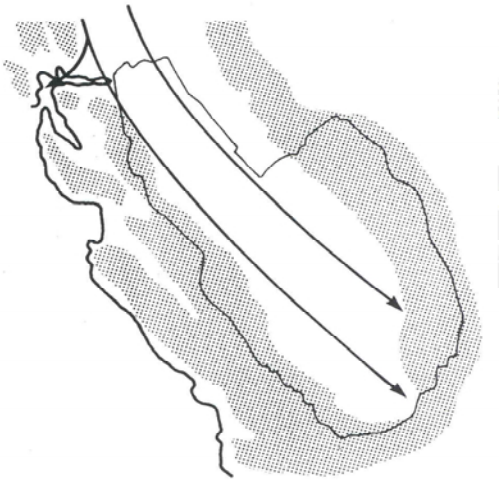
I Airflow



II Downvalley / Drainage



III Southerly



IV Northerly (No Marine Air)

Figure
8.1-6 San Joaquin Valley Air Flow Pattern Types

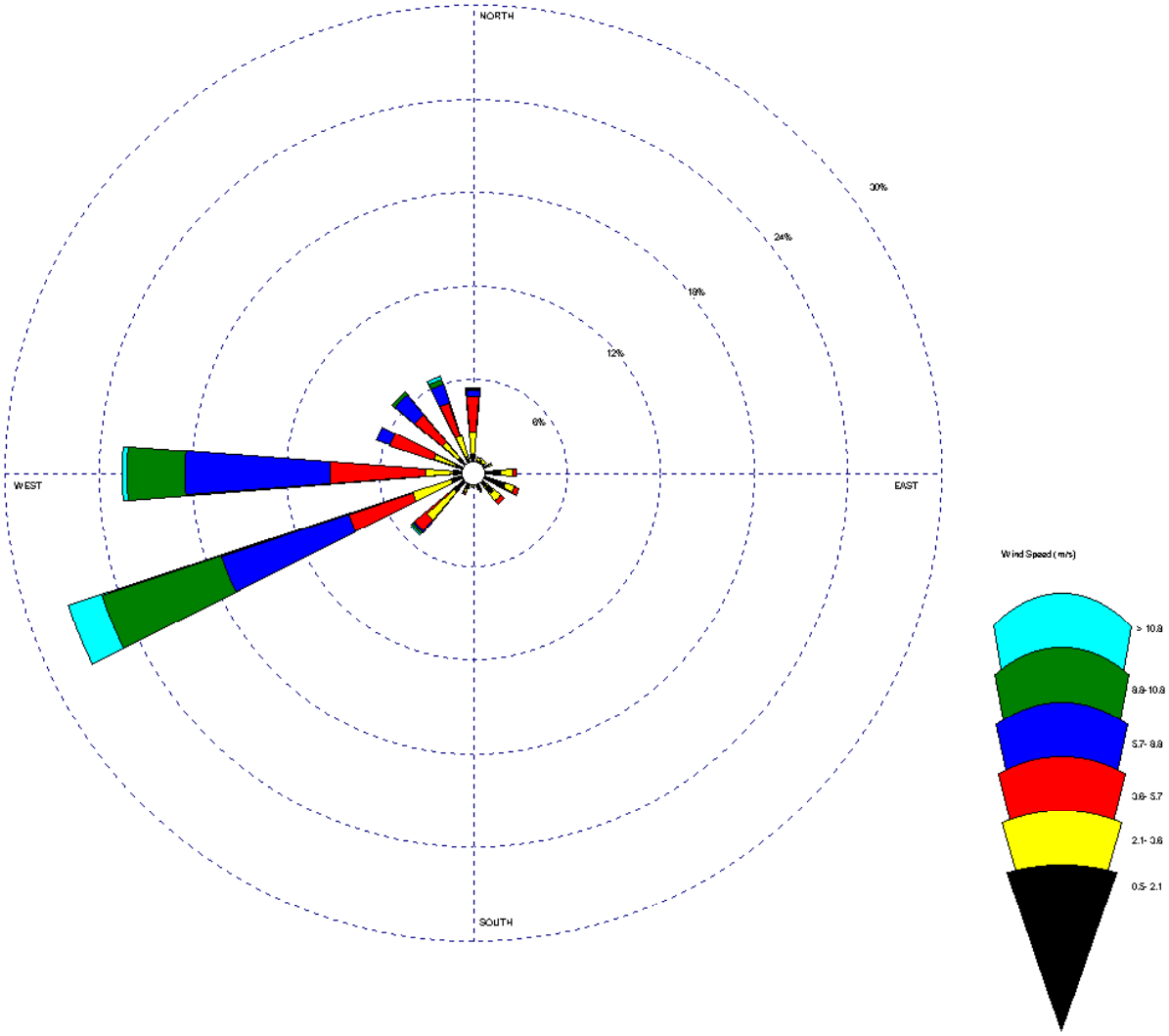


Figure
8.1-7a Wind Rose for Tracy Monitoring Station
(January 1, 1997 through December 31, 1997)

Figure 8.1-7b
Wind Rose for Tracy Monitoring Station
(January 1, 1998 through December 31, 1998)

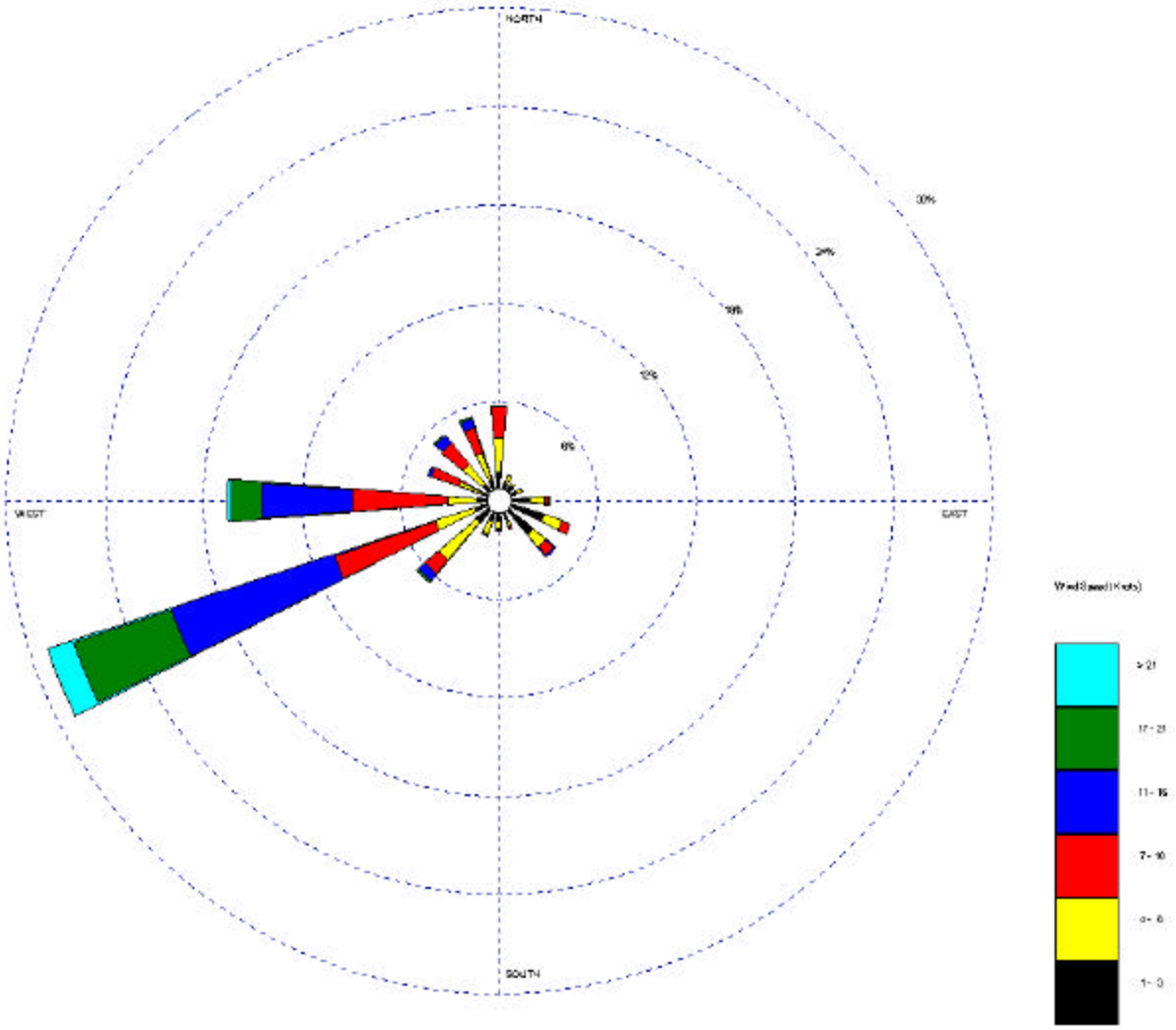


Figure 8.1-7c

Wind Rose for Tracy Monitoring Station
(January 1, 1999 through December 31, 1999)

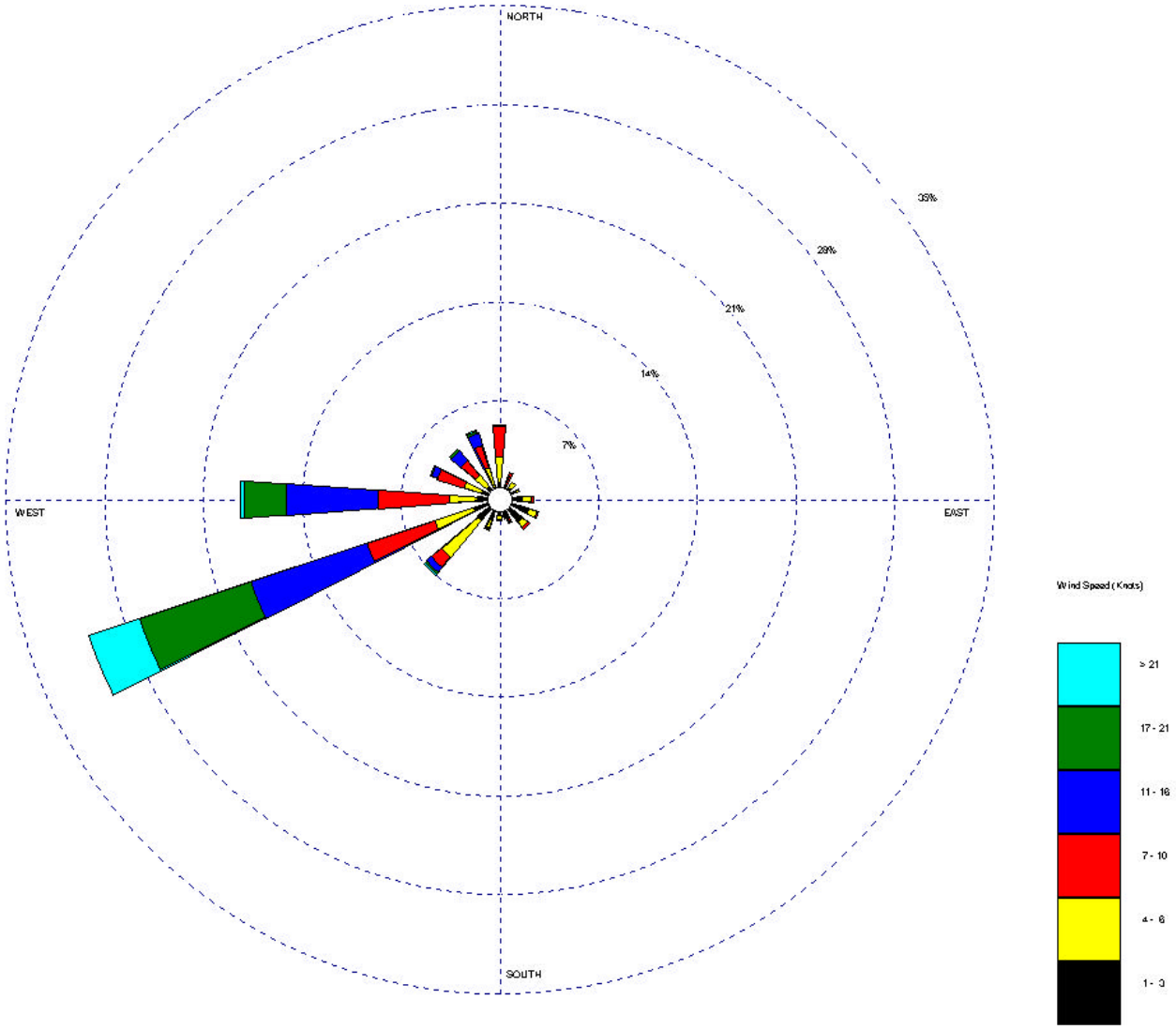


Figure 8.1-7d

Tracy Patterson Pass 1997-1999

January, February, March Quarterly Wind Rose

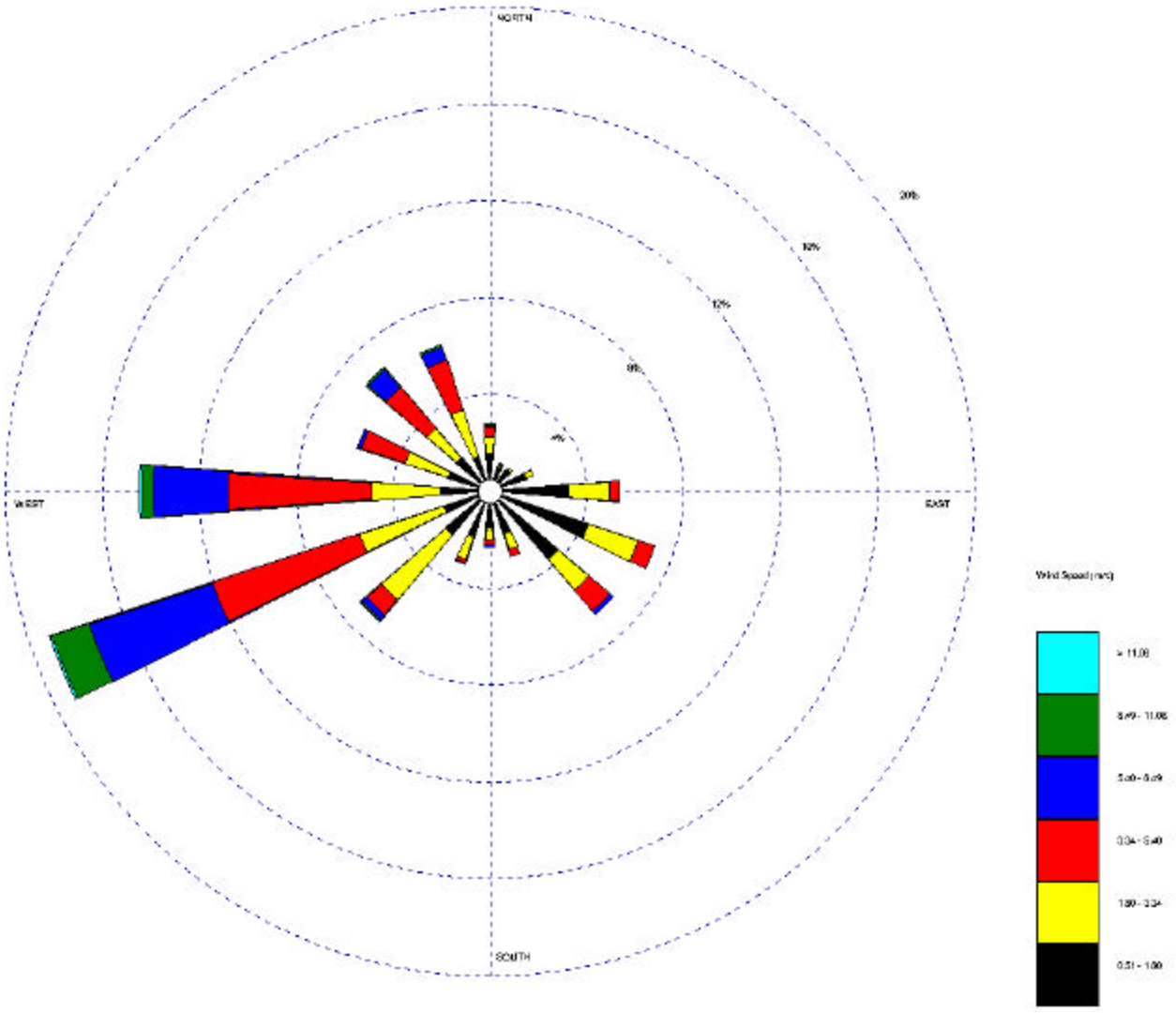


Figure 8.1-7e

Tracy Patterson Pass 1997-1999

April, May, June Quarterly Wind Rose

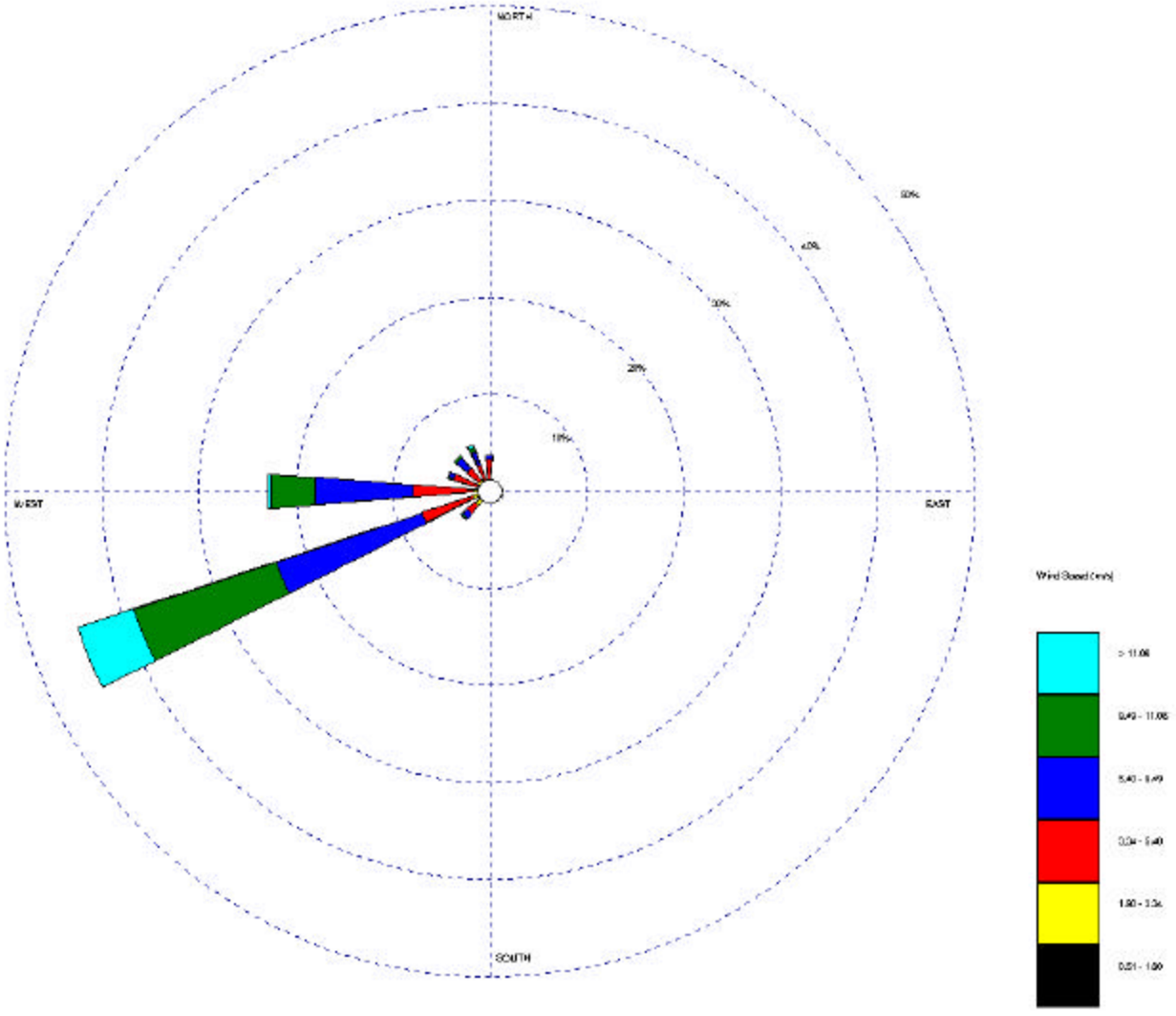


Figure 8.1-7f

Tracy Patterson Pass 1997-1999

July, August, September Quarterly Wind Rose

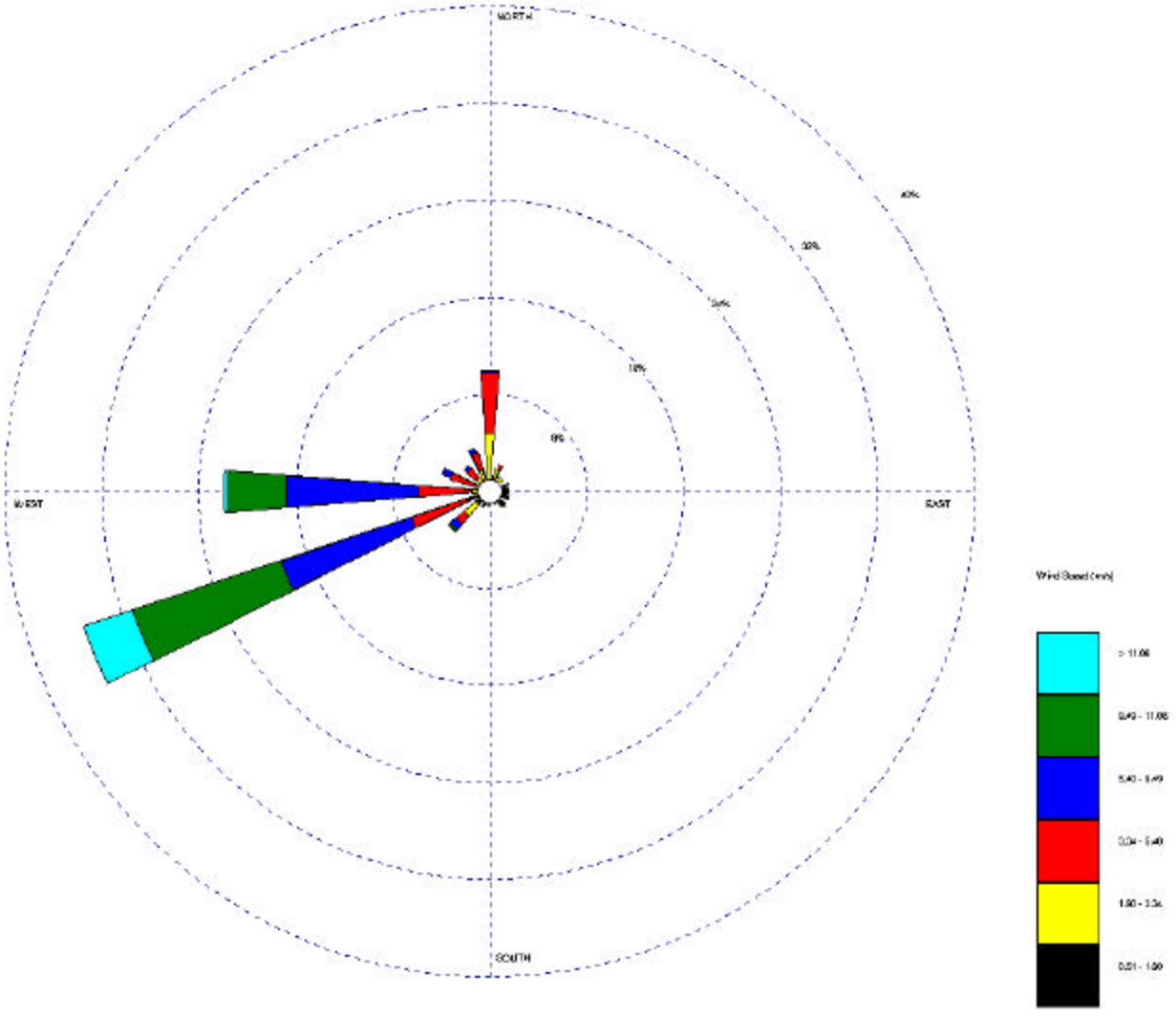
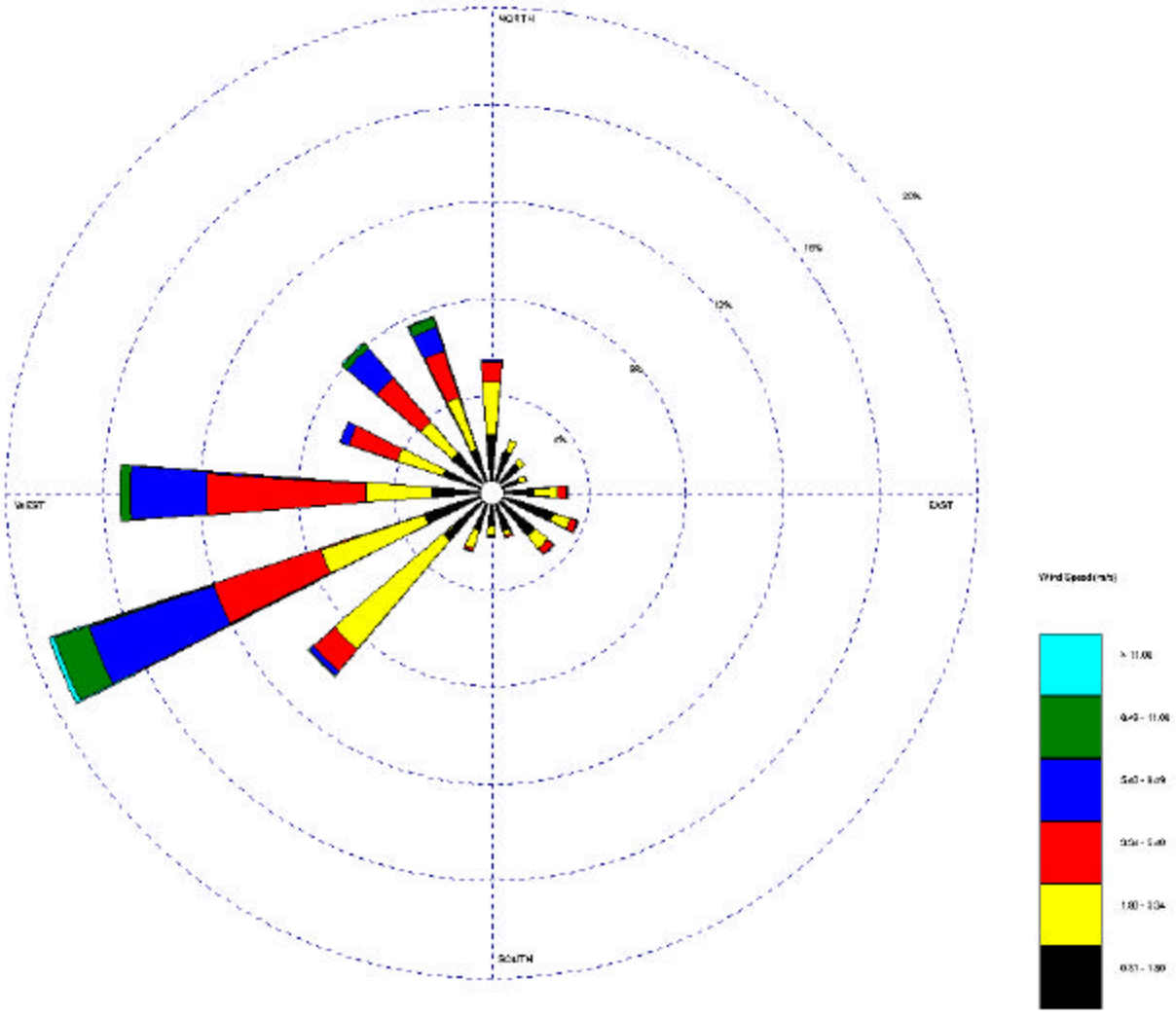


Figure 8.1-7g

Tracy Patterson Pass 1997-1999

October, November, December Quarterly Wind Rose



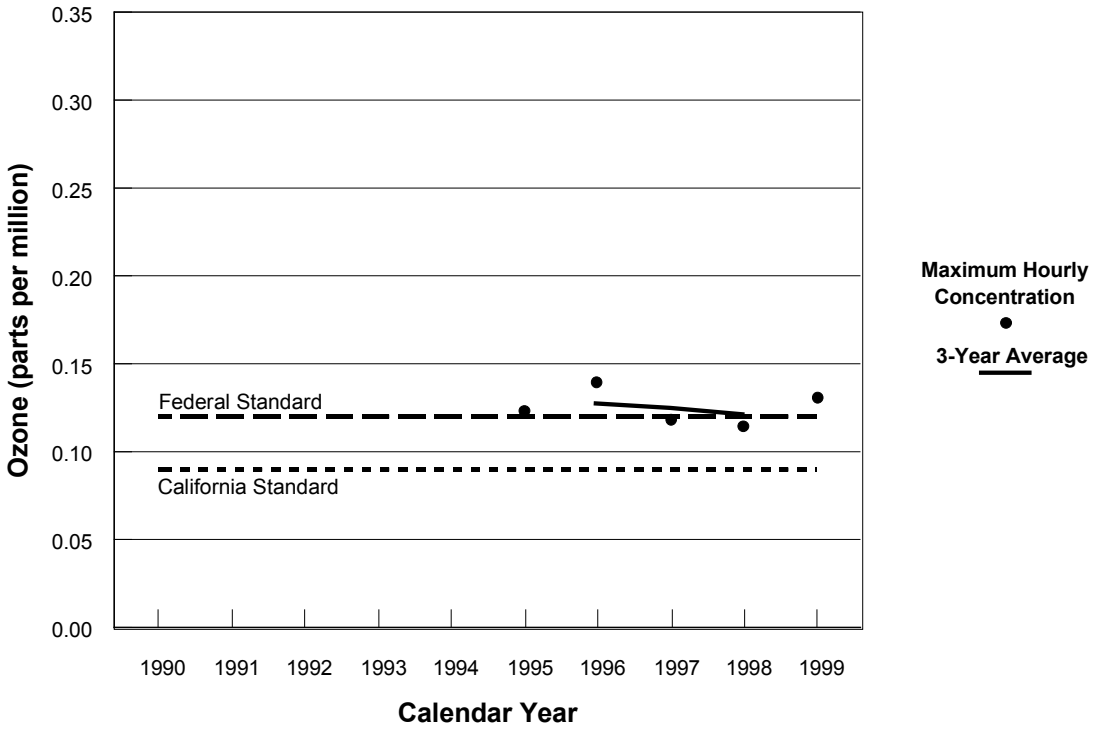


Figure 8.1-8
Maximum Hourly Ozone Level, 24371 Patterson Pass Road, Tracy, 1995 to 1999

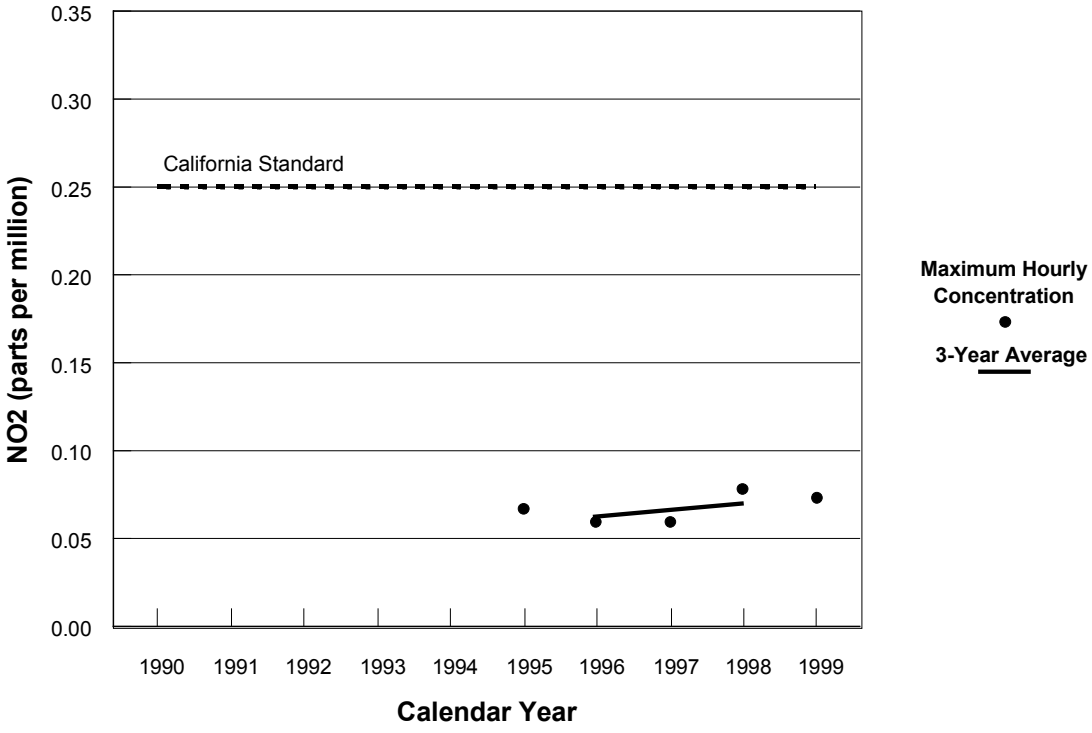


Figure 8.1-9
Maximum 1-Hour Average NO_2 Level, 24371 Patterson Pass Road, Tracy, 1995 to 1999

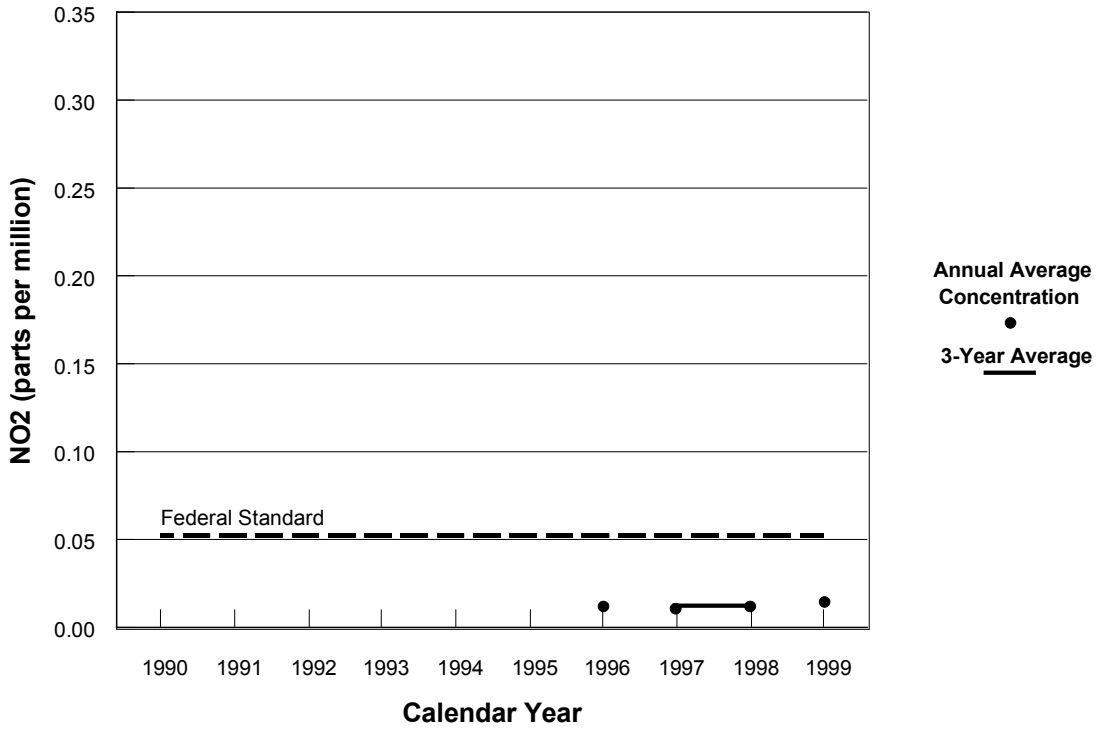


Figure 8.1-10
Maximum Annual Average NO_2 Level, 24371 Patterson Pass Road, Tracy, 1996 to 1999

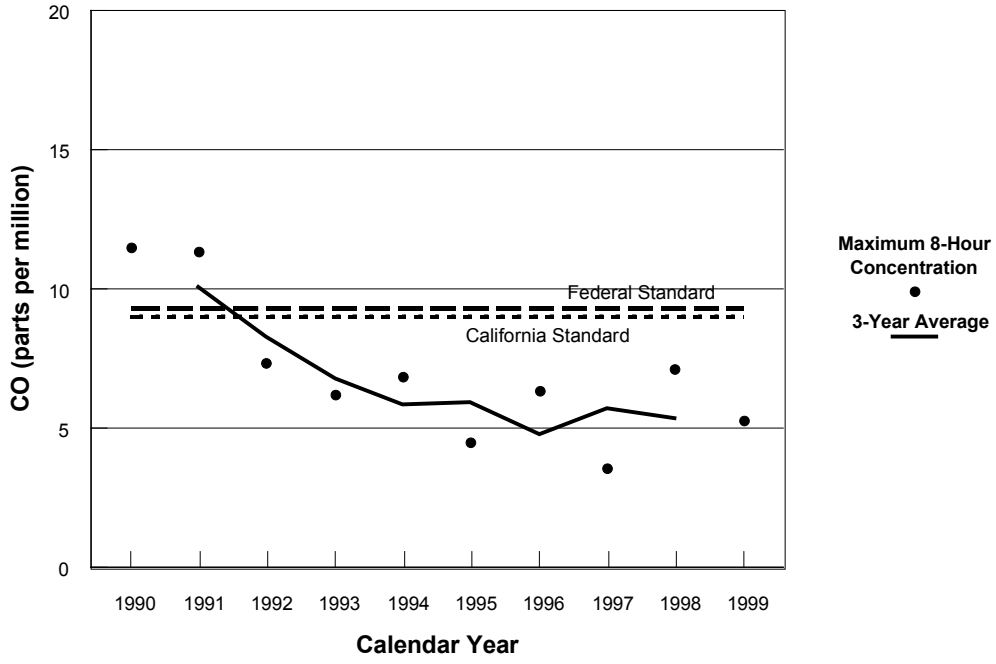


Figure 8.1-11
Maximum 8-Hour CO Level, Old First Street, Livermore, 1990 to 1999

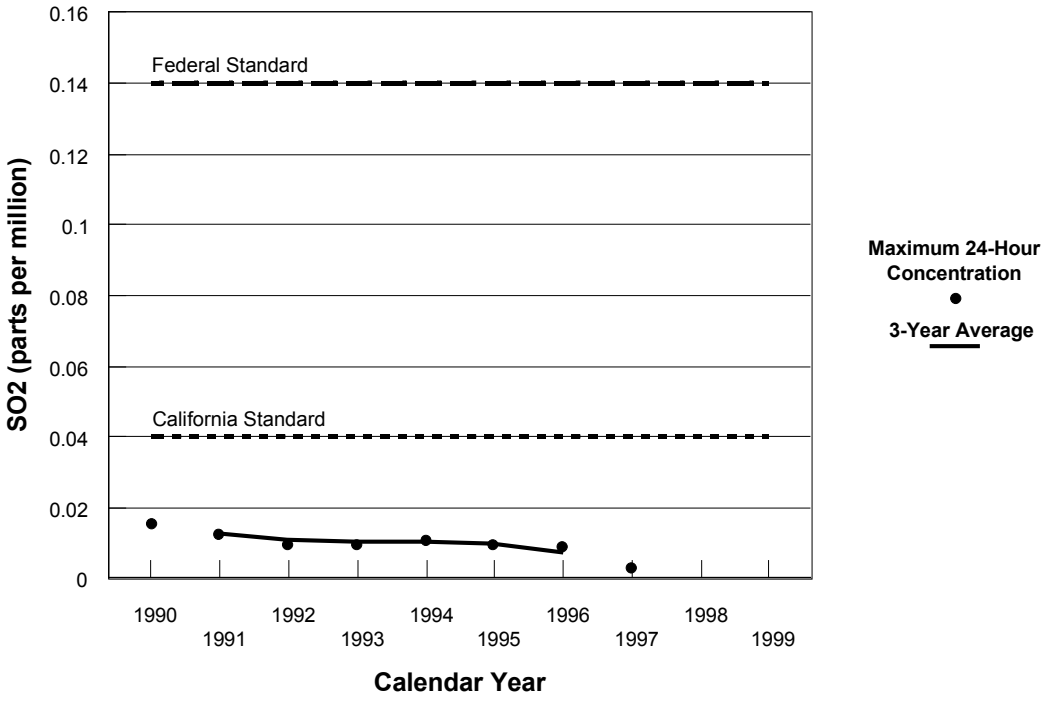


Figure 8.1-12
Maximum 24-Hour SO_2 Level, 1st Street, Fresno, 1990 to 1997

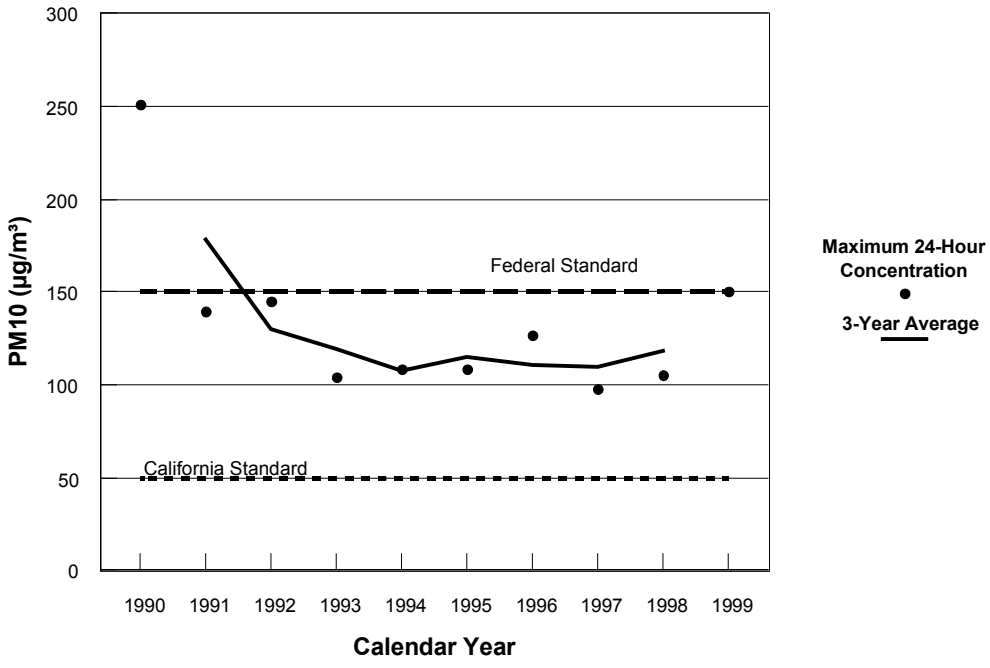


Figure 8.1-13
Maximum 24-Hour PM_{10} Levels, Old First Street, Livermore, 1990 to 1999

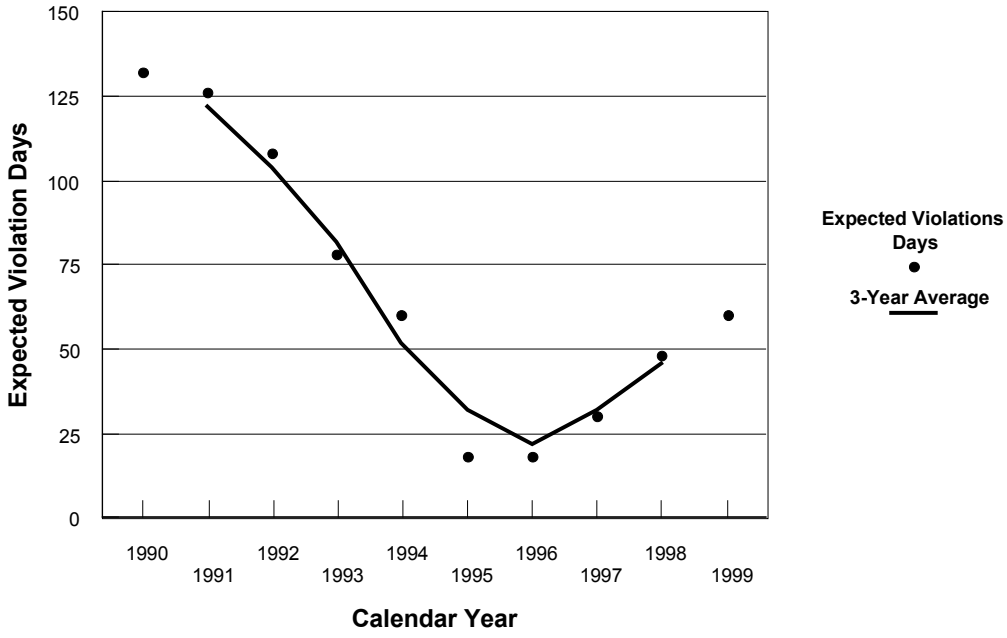


Figure 8.1-14
Expected Violations of the California 24-Hour PM_{10} Standard (50 μg/m³), Old First Street, Livermore, 1990 to 1999

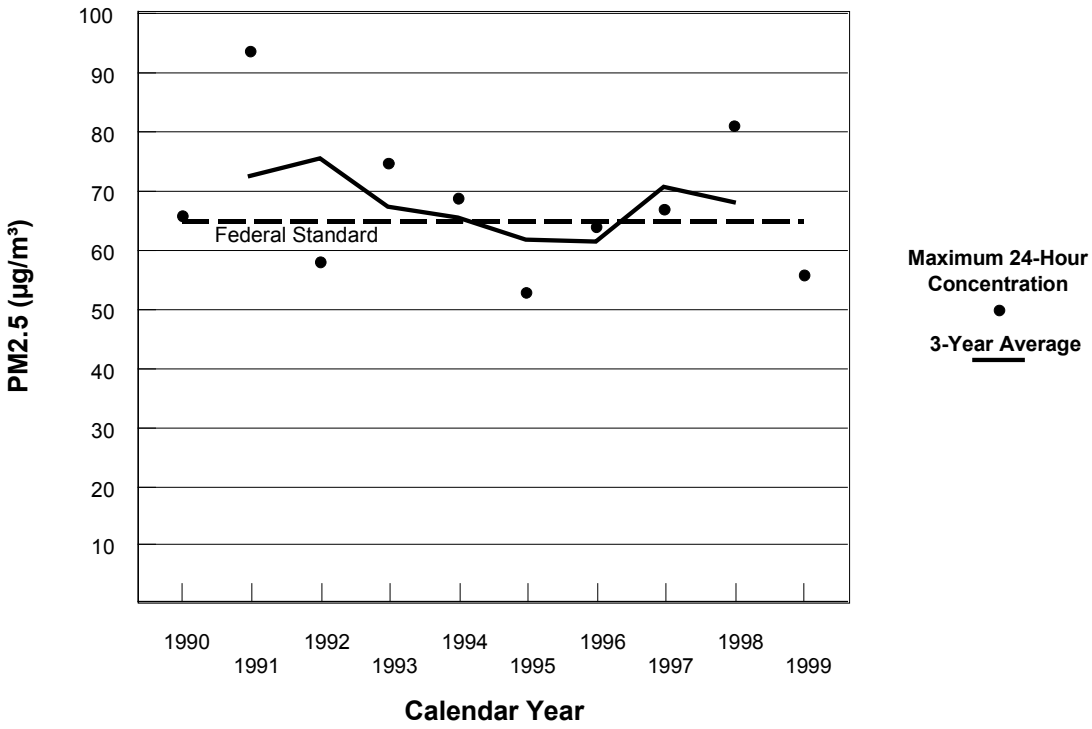


Figure 8.1-15
Maximum 24-Hour $PM_{2.5}$ Levels, Hazelton Street, Stockton, 1990 to 1999

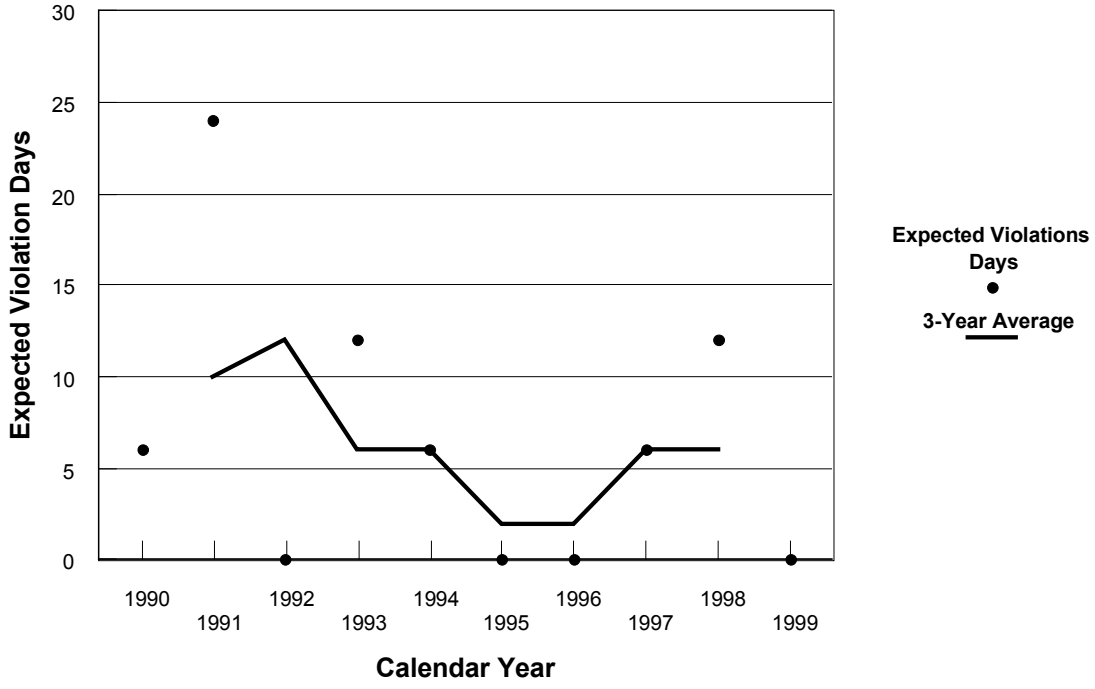
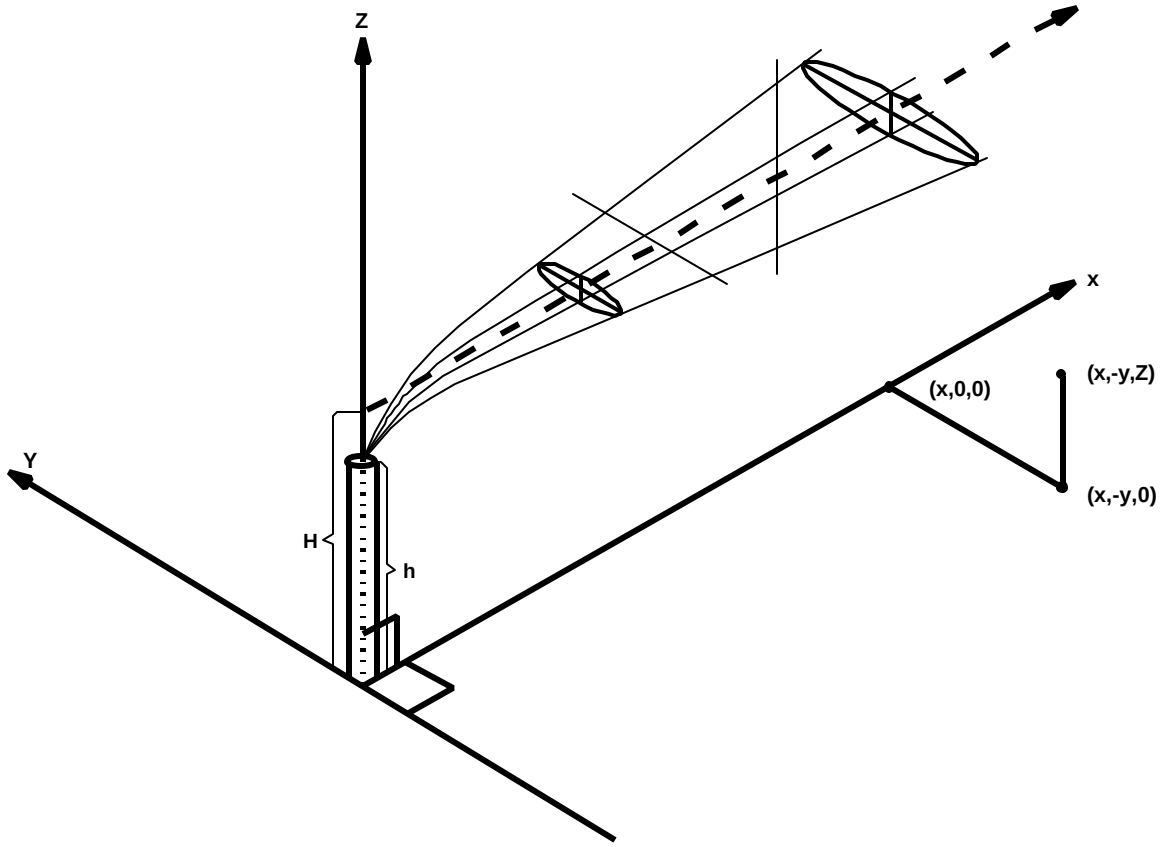


Figure 8.1-16
Expected Violations of the California 24-Hour PM2.5 Standard (65 µg/m3), Hazelton Street, Stockton, 1990 to 1999

Figure 8.1-17
Coordinate System Showing Gaussian Distributions



Coordinate system showing Gaussian distributions in the horizontal and vertical.

Figure 8.1-18

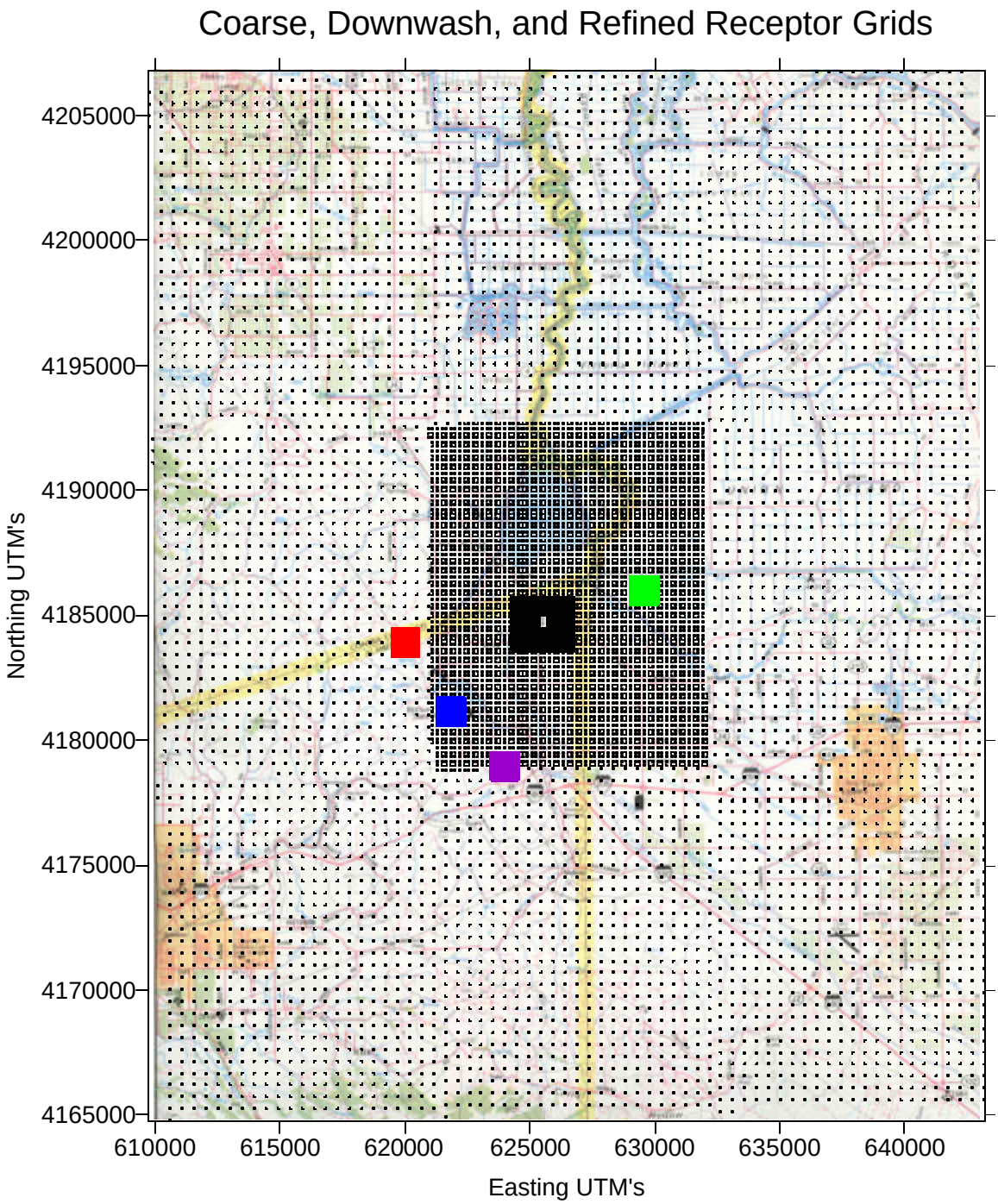
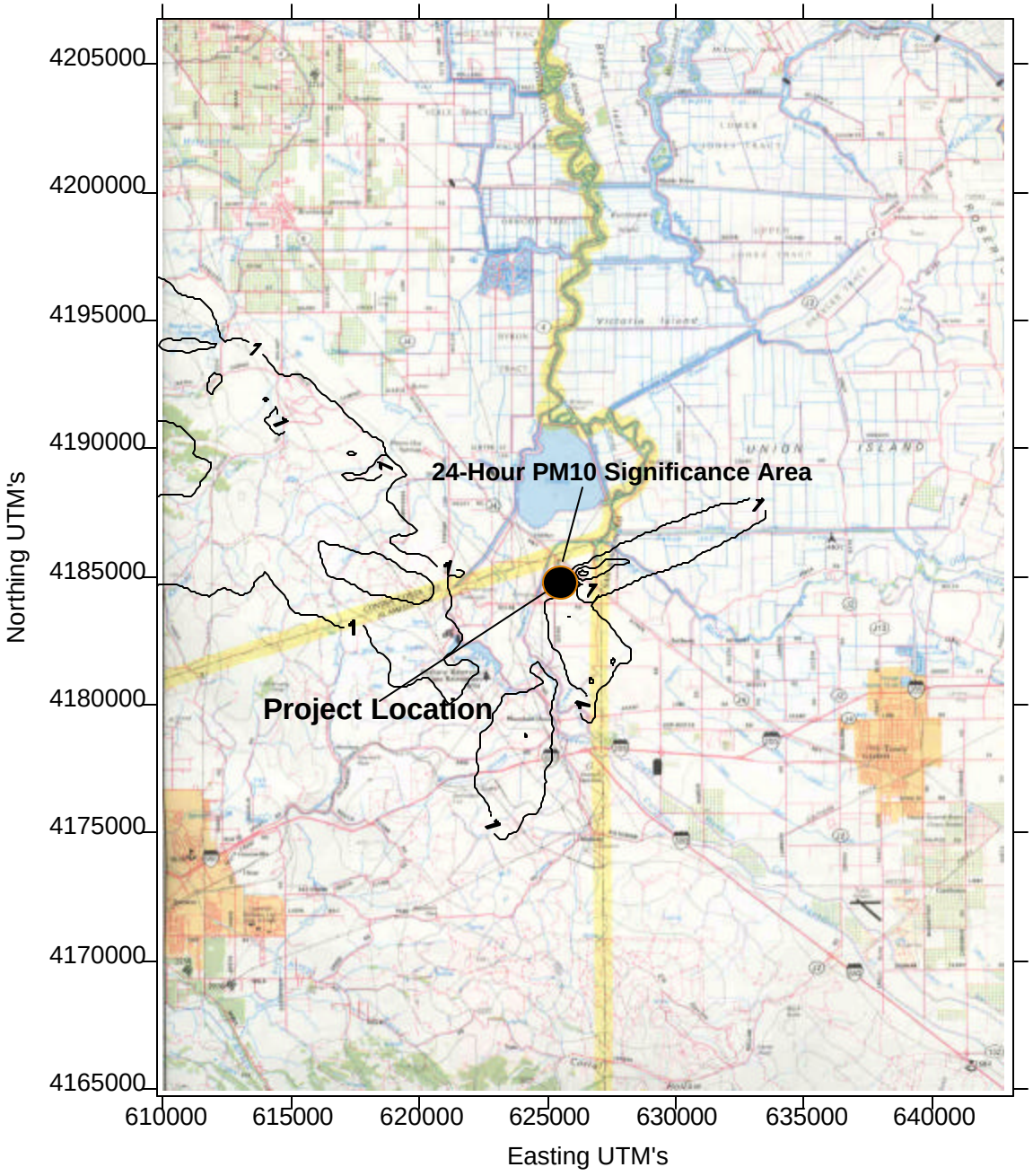

Coarse, Downwash, and Refined Receptor Grids
Northing UTM's
4205000
4200000
4195000
4190000
4185000
4180000
4175000
4170000
4165000
610000
615000
620000
625000
630000
635000
640000
Easting UTM's

Figure 8.1-19
24-Hour PM_{10} Significance Area



8.2 Biological Resources

The following sections describe the biological resources occurring on the project site, along the project linears, and in the habitat in the project vicinity. It describes and evaluates the biological resources with respect to the habitats, wildlife and special-status plants and animals that are known to, or that could potentially, use the project site. It further describes the potential consequences to biological resources of implementing the proposed project, and where appropriate, proposes mitigation measures intended to avoid, minimize, or compensate for potential adverse impacts to biological resources.

Section 8.2.1 describes the potentially affected environment. Section 8.2.2 discusses the impacts to biological resources. Section 8.2.3 describes the proposed mitigation measures for protection of biological resources. Section 8.2.4 discusses the cumulative impacts of the proposed project on biological resources. Section 8.2.5 discusses the LORS applicable to the protection of biological resources. Section 8.2.6 lists the permits and permitting schedule. Section 8.2.7 lists the natural resource agency contacts for the project or resources within the project area. Section 8.2.8 lists the references used in preparation of this section.

This biological analysis was prepared to describe vegetation and plant communities; wetlands; wildlife habitat for resident and migratory species; and potential habitat for threatened, endangered, or special-status species that could be affected by the proposed project. The analysis is based on information gathered during a review of existing references, consultation with federal and state agencies, and field surveys. The record review was based on information in previous environmental studies, published literature, and a search of the California Natural Diversity Database (CNDDB). Field surveys were used to confirm information from other sources, and provided additional insight into what special surveys or additional studies might be necessary. The site was visited on May 3, May 4, and August 14, 2000. Linear features were surveyed on November 2, 2000 and January 18, 2001. Surveys consisted of walking meandering transects through the center of the property or along linear features, noting habitat, plants, animals, and animal signs.

Vegetative communities are described consistent with the nomenclature proposed by Sawyer and Keeler-Woolf (1995). Wildlife habitat types are described consistent with the terms of the vegetative community, and according to the descriptions proposed by CDFG (Mayer and Laudenslayer, 1988). Names and identifications of animals are made according to Peterson (1990), Stebbins (1985), Jennings (1994), and Zeiner et al (1998, 1990a, and 1990b). Plants are named according to the Jepson Manual (Hickman, 1993).

Special-Status Species

Special-status species, including threatened and endangered species, were determined from a search of the CNDDB (Appendix 8.2C), the California Native Plant Society (CNPS) Electronic Inventory (CNPS, 1994-1999) (Appendix 8.2D) and personal knowledge of the habitats and resources of the project area.

8.2.1 Affected Environment

The following sections describe the potentially affected environment of the project site, with respect to habitat, wildlife, and sensitive species that use or that could potentially use the project site and adjacent areas.

8.2.1.1 Habitat

The proposed project site is located in Alameda County, east of Tracy Pumping Station on the Delta-Mendota Canal, approximately 8 miles northwest of the City of Tracy, California. The general project region has a mediterranean climate and supports a mosaic of pastures, dairies, alfalfa fields, hay, row crops, orchards, annual grasslands, and landscape tree communities. An irrigation ditch runs the length of the eastern boundary of the project site, providing a narrow band (less than 5 feet) of wetland vegetation. The remaining area of the parcel is agricultural habitat, planted in an alfalfa-oat rotation (Figure 8.2-1). Principal land uses in the region are row and field crops, pastures, and vineyards. These land uses remain prevalent in the county although housing and industrial land uses are becoming more common. Habitat types potentially affected in the project area comprise agricultural, annual grassland, alkaline meadows, emergent marsh and irrigation ditches, riparian shrub, and landscape and urban.

Agricultural. The project site is dominated by agricultural uses, consisting of primarily oat-hay in the north end and a dense crop of alfalfa, tomatoes, or lima beans (depending on the season) on the southern half. In addition to cultivated crops, the edges of the parcel support small patches of weeds and ruderal grassland. The parcel has slender oat grass (*Avena barbata*) interspersed with several weedy plant species, including common knotweed (*Polygonum arenastrum*), common chickweed (*Stellaria media*), scarlet pimpernel (*Anagallis arvensis*), and fiddleneck (*Amsinckia menziesii* var. *intermedia*). Common groundsel (*Senecio vulgare*) and thistle (*Sonchus* sp.) are also present in the hay pasture. The parcel appears to have been under cultivation for many years, and the site is essentially flat, with no significant topographic features on most of the parcel, though the site is crossed by concrete-lined drainage ditches, and is reported to have subterranean tiles to collect return flow. Similar agricultural uses such as oat-hay, alfalfa, and row crops dominate surrounding properties.

Annual Grassland. Annual grassland and ruderal vegetation are present along roadways and the uncultivated areas immediately adjacent to an irrigation ditch running along the east side of the project site. Annual grassland is characterized by introduced mediterranean grasses such as brome (*Bromus diandrus, B. hordeaceous),* oats (*Avena fatua*), and barley (*Hordeum murinum*). Dominant forbs also tend to be introduced species such as storksbill (*Erodium cicutarium*), wild radish (*Raphanus sativa*), and mustard (*Brassica nigra*). Other species identified in field surveys were bristly ox-tongue (*Picris echioides*), common bindweed (*Convolvulus arvensis*), broadleaf plantain (*Plantago major*), Italian ryegrass (*Lolium multiflorum*), slender oat grass, shepherds purse (*Capsella bursa-pastori*), thistle, and common malva (*Malva neglecta*). These species are widespread and are typical of disturbed grasslands.

Alkaline Meadow. Alkaline meadow as described by Holland (1989) occurs sporadically in the Central Valley where shallow water table, hardpan clay soils, or saline waters intrude on

surface growth. It looks superficially like annual grassland, but has more sparse vegetation, often showing barren earth or small amounts of salt encrustation. A large area of alkaline meadow habitat occurs northeast of the intersection of Bruns and Kelso roads, approximately 1 mile west of the project site (see Figure 8.2-1 and Figure 8.9-1, Soil Survey Map). Because typical invasive grasses survive poorly on alkaline soils, these meadows are often habitat for a community of especially adapted plant species that are native and potentially rare. The low-growing and sparse plant cover is also attractive to some wildlife such as burrowing owls. This area was recognized early in the design process as a potentially sensitive habitat, and the applicant has specifically designed features to avoid them. The only project feature that would potentially cross alkaline meadow would be a proposed water supply or gas pipeline alternative in the vicinity of Kelso and Bruns roads.

Emergent Marsh and Irrigation Ditches. The project site is bordered on the east side by an irrigation ditch that runs north to south. The whole length of the irrigation ditch, with the possible exception of the extreme north end, appears to be periodically bladed clean of vegetation, based on the smooth appearance of the banks and the discontinuous vegetation along the watercourse, ranging from dense clumps to individual plants. The most frequent and, in places, abundant plant species are narrowleaf plantain (*Plantago lanceolata*), rabbitsfoot grass (*Polypogon monspeliensis*), sour clover (*Melilotus indica*), prickly sow thistle (*Sonchus asper*), perennial ryegrass (*Lolium perenne*), Italian ryegrass (*L. multiflorum*), alkali mallow (*Malva leprosa*), ripgut brome, willow herb (*Epilobium ciliatum*), and tall flatsedge (*Cyperus eragrostis*).

Irrigation ditches, streams, ponds, and potential wetlands occur near or cross various alternative linear routes. As noted in Section 8.14, predominant surface water features in the project vicinity are the Delta-Mendota Canal, California Aqueduct, Old River, Clifton Court Forebay, Canal 45 (operated by BBID), and Mountain House Creek, which drains the foothills approximately 4 miles southwest of the project site. Several unnamed drainages run parallel to Mountain House Creek and drain the foothills west of the site. Some of these drainages and portions of Canal 45 support patchy stands of bullrush and cattails that are small, but functional emergent marsh habitat. Between the California Aqueduct and Delta-Mendota Canal, an unnamed drainage pools on the shallow hardpan soils creating numerous ephemeral ponds and wet areas that could be characterized as vernal pools. Most agricultural fields and some pastures are crossed by irrigation ditches and drains that may also be considered wetlands. Finally, farm ponds occur on several properties in the vicinity, including one behind the Mountain House School, located approximately 1 mile south of the project site. These man-made wetlands are highly modified and maintained, and generally lack substantial riparian or marsh type vegetation. However, federal law protects all wetlands as sensitive and limited habitats.

Two amphibian species, the federally listed endangered red-legged frog, a Species of Special Concern tiger salamander, are locally abundant in the foothills 2 miles southwest of the project and may occur in these farm pond-type wetlands or may be temporarily present in any seasonally wet area. Wetlands occur along the project linear features primarily west of the project. Methods of preventing impact to these wetlands during pipeline construction would consist of avoidance, minimization of construction area, and restoration after construction, as well as obtaining and complying with appropriate federal and state permits.

Riparian Shrub Communities. Riparian shrub communities occur in a few places in the project vicinity, although none is present on the project site. Where Mountain House Creek and an unnamed drainage cross Byron Bethany Road from southwest to northeast, water has ponded near the road berm and supports a small area (0.2 acre) of willows, oaks, and giant cane (*Arundo donax*). These areas would potentially be affected by construction of the recycled water pipelines (4a, 4b). There is a similar stand of willows and emergent wetland vegetation crossing Bruns Road that would be affected by water supply Alternative 3c[1]. Riparian habitat supports a diverse and abundant fauna, and avoiding impacts to these areas is desirable. Impacts can be avoided or minimized by using HDD construction techniques to prevent surface disturbance, or constructing during the winter season, when there may be fewer resources restricted to these habitats.

Industrial, Landscape, and Urban. A residential compound is present at the southwest corner of the 174-acre property, surrounded by landscape trees (Australian pine [*Casuarina equisitefolia*]), and the project site is surrounded on three sides by 2-lane paved highways that comprise urban and landscape habitat. To the west, the Western substation has been cleared and landscaped with redwoods, oleanders, juniper, and non-native shrubs and trees. Small areas of lawn, barns and houses, an abandoned milking shed, and similar components of urban habitat are present on the project site.

Overall vegetation on the project site comprises agricultural crop species that are widely distributed and relatively common.

8.2.1.2 Wildlife

Wildlife that use the mixed agricultural and pasture habitat on the project site tend to occur across all habitat types rather than only a single habitat. Species that commonly use the patchwork of changing crops include California ground squirrel (*Spermophilus beecheyi),* voles (*Microtus californicus)*, mice (*Mus musculus),* coyote (*Canis latrans*), red fox (*Vulpes fulva*), opossum (*Didelphis virginianus)*, striped skunk (*Mephitis mephitis)*, killdeer (*Charadrius vociferus*), and long-billed curlew (*Numenius americanus*). Typical raptors are likely to include red-tailed hawk (*Buteo jamaicensis),* northern harrier (*Circus cyaneus*), and American kestrel (*Falco sparverius*). Reptiles and amphibians that are likely to occur include gopher snake (*Pituophis melanoleucus),* racer (*Coluber constrictor),* Western fence lizard (*Sceloperus occidentalis*), and Pacific tree frog (*Hyla regilla).*

Because the habitat is highly disturbed, most of the species in this area occur widely and are relatively common. Some sensitive and potentially rare species could also use this habitat, and they are discussed individually below. The more general habitat community, however, is not rare or limited in distribution. The location of the proposed project does not support any unique habitat features that are likely to support unique species or communities.

8.2.1.3 Sensitive Species

The following sections describe the potentially sensitive plants and animals that could occur in the project area. Sensitive species for purposes of this analysis are defined as those that are listed under either federal or state endangered species acts as threatened or endangered, or species proposed for such listing. In addition, the CDFG and CEC generally regard plant

[1] Alternative 3c was abandoned after early scoping.

species listed as 1B by the CNPS to qualify under the definition of "rare" for purposes of the California Environmental Quality Act (CEQA) analysis. Therefore, these are also regarded as sensitive in this analysis.

Special-status plant and animal species as determined from the CNDDB, CNPS, or consultations with USFWS and CDFG that are recorded or that could potentially occur in the project area are listed in Table 8.2-1 and shown on Figure 8.2-2. The special-status plant species that occur only in wet habitats were not included because wetland habitats and the plant species they support would be avoided by the project. Special-status species are described in further detail below.

Plants. Searches of the CNDDB and the CNPS Electronic Inventory (CNPS, 1994-2000) were performed for the Clifton Court Forebay, 7.5-minute United States Geological Survey quadrangle, as well as the surrounding eight quadrangle maps. A total of 28 special-status plant species were reported as present within the nine quadrangles (Appendix 8.2C).

Thirteen special-status plant species were considered to have no potential habitat at the project site. This includes nine "wetland" species: Suisun marsh aster (*Aster lentus*), bristly sedge (*Carex comosa*), rose-mallow (*Hibiscus lasiocarpus*), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Mason's lilaeopsis (*Lilaeopsis masonii*), delta mudwort (*Limosella subulata*), little mousetail (*Myosuros minimus*), hairless popcorn flower (*Plagiobothrys glaber*), and marsh skullcap (*Scutellaria galericulata*). The remaining four species were excluded based on their occurrence only at elevations higher than those that occur at the project site. These species are large-flowered fiddleneck (*Amsinckia grandiflora*), big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*), Mt. Diablo buckwheat (*Eriogonum truncatum*), and Diablo helianthella (*Helianthella castanea*).

The proposed project site is under intensive agricultural use and does not appear to have any undisturbed habitat or potential habitat for the remaining 15 special-status plant species that could occur in the area (see Table 8.2-1). No natural drainages or ponds are evident, other than maintained irrigation channels.

The irrigation ditch on the eastern boundary is deeply incised and despite the perennial flows has an abrupt gradient from wet habitat to dry habitat. This irrigation ditch is also regularly maintained (i.e., by blading) and has no woody vegetation or emergent vegetation. Long-term periodic maintenance has eliminated the potential for special-status plant species to occur here. The flat, irrigated, cultivated fields and maintained irrigation channels (concrete and herbicides) provide no special-status plant habitat.

The presence of several individual plants each of alkali weed and alkali heath (*Frankenia salina*) adjacent to the irrigation ditch on a compacted, dry farm road that borders the eastern boundary of the northernmost hay field indicate the potential for some residual alkali sink species onsite. Therefore, special-status alkali species that could occur in dry or seasonally wet habitats on the list of special-status plants (Table 8.2-1) with potential to occur at the project site were included in field surveys. However, the project site is heavily disturbed and too small to represent functional habitat. The plant species in Table 8.2-1 are considered to have a very low potential to occur on the project site. No special-status plant species were observed during field surveys on May 4 or August 14, 2000.

The project linears cross through a variety of habitats, including disturbed annual grassland, agriculture, industrial and urban, alkaline meadows, and riparian shrub communities. Many of the plant species in Table 8.2-1 would potentially occur only in the alkaline meadow habitats that occur near the corner of Kelso and Bruns roads. Some (i.e., Big tarplant and Showy Indian clover) could potentially occur along grassland portions of project linear features. The project would minimize potential adverse impact by performing pre-design surveys to identify the presence of these special-status species, and either avoid them or take other actions to mitigate potential adverse impacts according to the appropriate protective laws. Reconnaissance surveys of project linears on January 18, 2001, indicate that most of the habitat is highly disturbed, and is either presently or historically in agricultural production. It is unlikely that the habitat crossed by project linears would support any intact native habitat or sensitive plant species.

Animals. Two federally listed species (San Joaquin kit fox and California Red-legged frog), one state-listed species (Swainson's hawk), and seven proposed candidate, protected, or species of concern may occur on the project site and along project linears.

San Joaquin kit fox (*Vulpes macrotis mutica*) historically ranged throughout San Joaquin Valley and parts of Alameda and Contra Costa counties. Although no kit foxes have been observed on the project site, the project area represents at least historical habitat. CNDDB lists historical sightings along the Old River and Mountain House Creek. The San Joaquin kit fox lives in native grassland and desert shrubs, and feeds on insects and small mammals. Habitat modification, hunting, and pesticides have reduced this formerly abundant species. The project site is potentially suitable habitat for kit fox foraging, although no natal dens or burrows were observed during reconnaissance surveys.

The project linear features follow road berms, rights-of-way, and levees that may be suitable for kit fox dens. Reconnaissance surveys on January 18, 2001, did not identify any burrows or den sites along proposed project linears, but ground squirrel holes (which could be enlarged by a fox) were abundant. To minimize the potential for adverse impact to kit foxes, the applicant will implement pre-design surveys of the linears to identify the presence of any burrows or dens so that avoidance measures can be planned. The project applicant would also prepare and comply with a Section 7 authorization from the USFWS, which will specify conditions to implement that will avoid, minimize, or compensate for any potential adverse impact to kit foxes.

San Joaquin County is in the process of implementing a regional habitat conservation plan (HCP) that applies a "per-acre" mitigation fee to development projects. The fee is used for preservation and purchase of suitable habitat to support the fox. Paying in lieu fees into a conservation bank may be a method used by the applicant to compensate for lost habitat.

The California Red-legged frog (*Rana aurora Californicus*) is a federal threatened species that breeds in farm ponds and still waters in the coastal foothills in the project area. During the non-breeding season, frogs can move over substantial distances foraging in farm fields and along riparian corridors. The core red-legged frog habitat designated by USFWS is primarily west of the project site and project linears, in the coastal foothills. But the species has also been reported from several locations within 1 mile of the project site, and although it is unlikely to breed on the project site, could be present during post-breeding dispersal. Three small potholes approximately 20 feet across on the site could be used as temporary habitat,

but these pools do not appear to be perennial, and frogs would need to find burrows or other refugia during the dry months of the year. Red-legged frogs could potentially occur on the project site during post-breeding dispersal, but would not be likely to breed or remain there during agricultural operations.

Project linears cross and run parallel to many small waterways including Mountain House Creek, Canal 45, the Delta-Mendota Canal, and several farm ponds (i.e., west of Mountain House School) that are potential habitat for red-legged frogs. A reconnaissance and spotlight survey on January 18, 2001, revealed that most farm ponds, and most of Canal 45, were dry and therefore not suitable habitat. Mountain House Creek was dry at the point where it crosses Byron Bethany Road, and therefore these areas are not suitable perennial habitat for the frog. Several ponds draining agricultural fields did contain water as did natural drainages near the corner of Kelso and Bruns roads. Spotlighting at these sites on January 18, 2001, did not detect any frogs. Construction of project linears, particularly west of the project in the coastal foothills, would have a low potential to adversely affect dispersing frogs. Avoiding wetland habitat would effectively reduce this impact to less than significant.

To minimize potential adverse impacts to red-legged frogs, pre-design surveys of all linears will be conducted to identify potentially suitable habitat for the purpose of avoiding these areas. If surveys indicate red-legged frogs in the project area, the applicant would further apply for and comply with a Section 7 incidental take permit, which will specify conditions to implement that will avoid, minimize, or compensate for any potential adverse impact to red-legged frogs.

As noted above San Joaquin County is in the process of developing a regional Habitat Conservation Plan that may include in lieu fees for mitigating impacts to kit fox. There is also a private mitigation bank located near the Byron Airport in Contra Costa that may be available for mitigation credits.

The Swainson's hawk (*Buteo swainsoni*) is a state-listed species that may seasonally forage on the project site or in the project vicinity. In summer, Swainson's hawks are attracted to abundant insects and small rodents in alfalfa fields and open pasture. While they may forage up to 10 miles from a nest site, they do require a relatively large tree, commonly on or near water, for nesting. Valley oak and sycamore are common species that support nests. The majority of hawks winter in South America, although a small number are known to over-winter in the Delta. No suitable nest trees occur on the site or adjacent areas, and none were observed during surveys on May 4, August 14, 2000, or January 18, 2001.

A historical record (1989) of Swainson's hawk nesting occurs near one of the proposed gas line alternatives (2b)[2], near the Delta-Mendota Canal. This site was examined on January 18, 2001, for indications of stick nests or other signs of hawk nesting, and none were present. It appeared there were two large conifers that had fallen or been removed near the property where the nests were reported, so these nests may no longer be active. To minimize impacts to Swainson's hawk, the project applicant would perform surveys in 2001 to identify locations of known nests within ½ mile of project features, so that construction in the vicinity of those nests can be avoided during the active season.

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[2] Gas supply line Alternative 2b was abandoned during early project scoping.

TABLE 8.2-1A
Special-status Species Potentially Occurring In EAEC Project Area

Common Name	Scientific Name[a]	Status[b] (Fed/CA)	Season[c]
Plants			
Alkali milkvetch	*Astragalus tener var. tener*	SC/1B	Mar-Jun
Ferris' milkvetch	*Astragalus tener var ferrisiae*	SC/1B	Mar-Jun
Heartscale	*Atriplex cordulata*	SC/1B	Apr-Oct
San Joaquin saltbrush	*Atriplex joaquiniana*	SC/1B	May-Oct
Brittlescale	*Atriplex depressa*	--/1B	May-Oct
Big tarplant	*Blepharizonia plumose*	--/1B	Jul-Oct
Hispid bird's-beak	*Cordylanthus mollis ssp. Hispidus*	FE/CE/1B	Jun-Sep
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	SC/1B	May-Oct
Recurved larkspur	*Delphinium recurvatum*	SC/1B	Mar-May
Diamond petaled California poppy	*Eschscholzia rhombipetala*	SC/1A	Mar-Jun
Showy madia	*Madia radiata*	--/1B	Mar-Jun
Showy Indian clover	*Trifolium amoenum*	FE/1B	Apr- Jun
Rayless ragwort	*Senecio aphanactis*	--/2	Jan-Apr
Caper-fruited tropidocarpum	*Tropidocarpum capparideum*	--SC/1A	Mar-Apr
Insects and Crustacea			
None			
Mammals			
San Joaquin Pocket Mouse	*Perognathus inornatus inornatus*	SC/--	Resident
San Joaquin Kit fox	*Vulpes macrotis mutica*	FE/--	Resident
Reptiles and Amphibians			
California Red-legged Frog	*Rana aurora draytonii*	T/SC	Resident
Western Pond Turtle	*Clemmys marmorata*	SC/SC	Resident
California tiger salamander	*Ambystoma californiense*	C/SC	Resident

TABLE 8.2-1A
Special-status Species Potentially Occurring In EAEC Project Area

Common Name	Scientific Name[a]	Status[b] (Fed/CA)	Season[c]
Birds			
White-tailed kite	*Elanus leucurus*	--/FP	Resident
Burrowing owl	*Athene cunicularia*	SC/SC	Primarily summer migrant
California horned lark	*Eremophila alpestris actia*	--/SC	Summer migrant
Swainson's hawk	*Buteo swainsoni*	--/T	Primarily summer migrant
Tricolored backbird	*Agelaius tricolor*	SC/SC	Summer migrant

NOTES:
[a]Scientific names are based on the following sources: AOU 1983, Jennings 1998, Zeiner *et al.* 1990.
[b]Status = Status of species relative to the Federal and California State Endangered Species Acts and Fish and Game Code.
Fed = Federal Status.
E = Federally listed as endangered.
T = Federally listed as threatened.
PE = Proposed endangered.
PT = Proposed threatened.
C = Candidate for listing as federal threatened or endangered threatened. Proposed rules have not yet been issued because they have been precluded at present by other listing activity.
SC = Species of Special Concern threatened. Proposed rules have not yet been issued because they have been precluded at present by other listing activity.
CA = California status.
E = Species whose continued existence in California is jeopardized.
T = Species that although not presently threatened in California with extinction, is likely to become endangered in the foreseeable future.
SC = California Department of Fish and Game "Species of Special Concern". Species with declining populations in California.
FP = Fully protected against take pursuant to the Fish and Game Code Section 3503.5.
-- = No California or federal status.
CNPS = California Native Plant Society Listing (does not apply to wildlife species).
1A = Plants presumed extinct in California.
1B = Plants, rare, threatened or endangered in California and elsewhere and are rare throughout their range. According to CNPS, all of the plants constituting List 1B meet the definitions of Sec. 1901,

Chapter 10 (Native Plant Protection) of the California Department of Fish and Game Code and are eligible for state listing.

Plants rare, threatened, or endangered in California, but more common elsewhere.
[c]Season = Blooming period for plants. Season of use for animals. RES = Resident; SUMR = Summer; WNTR = Winter.

TABLE 8.2-1B
Special-status Species Potentially Occurring In EAEC Project Area

Common Name	Primary Habitat[a]	Present on Site	Comments
Plants			
Alkali milkvetch	Low ground, alkali flats and flooded ground in annual grasslands, playas, vernal pools	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Ferris' milkvetch	Sub-alkaline flats on overflow land in CV. Usually in dry, adobe soils	S	Low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Heartscale	Alkaline flats and scalds in the CV, sandy soils	S	Low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
San Joaquin saltbrush	Seasonal alkali wetlands or alkali sink scrub w/ *Distichlis* and *Frankenia* etc.	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Brittlescale	Chenopod scrub, meadows, playas, valley and foothill grasslands, vernal pools, alkaline/ clay	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Big tarplant	Valley and foothill grassland	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site.
Hispid bird's-beak	Meadows, playas, valley and foothill grassland/ alkaline	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Palmate-bracted bird's-beak	Chenopod scrub, valley and foothill grassland/ alkaline	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Recurved larkspur	Alkaline soils, often in valley saltbrush or valley chenopod scrub, cismontane woodland or valley and foothill grassland	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Diamond petaled California poppy	Fallow fields. Alkaline, clay slopes and flats in valley and foothill grasslands	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Showy madia	Cismontane woodland, alkaline playas, valley and foothill grassland, vernal pools / mesic	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Showy Indian clover	Cismontane woodland, valley and foothill grassland. Drying alkaline flats	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.

TABLE 8.2-1B
Special-status Species Potentially Occurring In EAEC Project Area

Common Name	Primary Habitat[a]	Present on Site	Comments
Rayless ragwort	Valley and foothill grassland	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur on grassland portions of linear features.
Caper-fruited tropidocarpum	Chaparral, cismontane woodland, coastal scrub	U	Habitat is unsuitable on site and along project linears.
	Alkaline hills in valley and foothill grasslands	S	Site is highly modified for agricultural uses. Very low potential for occurrence on site. Species may occur in alkaline meadows near Kelso and Bruns Rd.
Insects and Crustacea			
None	None		
Mammals			
San Joaquin Pocket Mouse	Feeds on seeds in open dry grassland prairie	U	Site is highly modified for agricultural development and unlikely to support this species. Recent records indicate localities 10 miles SW of site.
San Joaquin Kit fox	An open prairie and desert brush fox. Breeds in large burrows	R	Historically species was known from throughout the region. CNDDB records indicate recent sighting in project vicinity.
Reptiles and Amphibians			
California Red-legged Frog	Breeds in slow moving streams and ponds with dense cover	R	Species has been recorded from general vicinity of site, but no breeding habitat on site. Species has been recorded from farm ponds and slow moving streams in vicinity of linears. Frogs can disperse as much as one-mile from known breeding sites.
Western Pond Turtle	Permanent water and slow moving streams	S	No suitable water on the project site. Species was recorded from Mountain House Creek, approximately 5 miles southeast of site, and Canal 70, 1 mile southwest of the site.
California tiger salamander	Ephemeral ponds and vernal pools	S	Site lacks any suitable ponds for breeding salamanders. Species may occur in vernal pools in vicinity of Kelso and Bruns Road. Species is locally abundant near Byron Airport, 8 miles northwest of site.

TABLE 8.2-1B
Special-status Species Potentially Occurring In EAEC Project Area

Common Name	Primary Habitat[a]	Present on Site	Comments
Birds			
White-tailed kite	Nests in trees near open grassy fields	S	Probably forages throughout project vicinity. No suitable nesting habitat on project site, but may nest in general region.
Burrowing owl	Nests in former squirrel burrows in short-grass prairie.	R	Canal banks near project site may contain suitable habitat for burrowing owls. Species is reported as locally abundant in road berms and levees. known from general region.
California horned lark	Nests in open grassland prairies	S	Species may forage throughout project vicinity. Probably does not nest on site due to agricultural uses. May nest in project vicinity.
Swainson's hawk	Nests in large cottonwoods along riparian corridors	R	Hawks may forage on and adjacent to project site. No suitable nest sites on project site, but nests are reported along Old River and near Delta Mendota Canal, near Mountain House Road.
Tricolored backbird	Cattail or tule marshes; Forages in fields, farms	S	Suitable foraging habitat throughout region. Suitable nesting habitat exists in riparian shrubs near Mountain House Creek and Canal 45.

NOTES:
[a]Primary
Habitat = Most likely habitat association.
[b]Present on site:
O = Observed onsite.
R = Recorded onsite.
S = Suitable habitat onsite.
U = Unsuitable habitat onsite.
SOURCE: California Dept. of Fish and Game, *California Natural Diversity Database*, 2000; California Native Plant Society, *Inventory of Rare and Endangered Vascular Plants Of California*, Feb. 1994;

Burrowing owl (*Athene cunicularia*) occur from Oregon to South America. However, their populations in California have been greatly reduced as a result of habitat modifications and possibly pesticide use. This easily observable owl is a species of special concern to CDFG. Burrowing owls are known in the general vicinity of the project, but because the area is intensively developed for agriculture, no burrowing owls are present on the project site, and no suitable burrows were observed. It is unlikely that owls would find suitable nesting there, although owls using adjacent sites may occasionally forage on the project site. Roadside berms and levees that occur near the gas and water pipeline alignments are suitable to support this species, and they are reported to be locally abundant during summer months. Reconnaissance surveys on January 18, 2001, indicated abundant squirrel burrows that could be used as owl burrows, particularly along alignments 3d and 2c. To minimize potential impacts to burrowing owl, the project applicant would perform surveys in 2001 to identify locations of known nests within 500 feet of project features, so that construction in the vicinity of those nests can be avoided during the active season.

White-tailed kite (*Elanus leucurus*) was once so scarce they were in danger of extinction. Their habit of flying slowly and hovering over prey before dropping into the grass on a mouse or large insect made them an easy target for casual shooters. The widespread use of organochlorine pesticides may have also caused nesting failures in this species. As a protected species, CDFG is interested in this bird. White-tailed kites forage over grasslands but require medium to large trees for nests. No suitable trees occur on the project site, although suitable trees are present on adjacent properties. White-tailed kites may nest in the vicinity of project linears.

California horned lark (*Eremophila alpestris*) is a species of special concern to CDFG and a management indicator of other ground-nesting birds typical of annual grasslands in which it forages and nests. The habitat on the project site, covered by irrigated alfalfa and row crops, is unlikely to support nesting horned larks, although they may occasionally forage there. Where portions of the project linears cross through annual grasslands that are not cropped, there is a potential for horned lark nests. To minimize potential impacts to horned larks, the project applicant would perform surveys in 2001 to identify locations of potential nests within 100 feet of project features, so that construction in the vicinity of those nests can be avoided during the active season.

The tricolored blackbird (*Agelaius tricolor*) is listed as a California Species of Concern. They are sporadic migrants and summer residents throughout California's Central Valley and the Sierra Nevada foothills. They generally breed near fresh water and emergent vegetation, such as tall dense cattails or tules, or willow thickets. They are distinct from their smaller cousins, the red-winged blackbird, in that they breed in huge colonies often of 1,000 birds or more, but seldom breed in the same place every year. Their sporadic movements and unpredictable reproduction cycles have made research on this species especially challenging. Land conversion for agriculture and urban development, and massive nest predation, has resulted in this species being greatly reduced from former numbers. No suitable nesting habitat occurs on or adjacent to the site; however, riparian shrubs that occur along Byron Bethany Road at the Mountain House and unnamed creek crossings would be potentially suitable habitat. To minimize potential impacts to tricolored blackbirds, the project applicant would perform surveys in 2001 to identify locations of potential nests

within 100 feet of project features. Construction in the vicinity of any nests discovered will be avoided during the active season.

The San Joaquin Pocket Mouse (*Perognathus inornatus inornatus)* is listed as a federal species of concern, and one subspecies is also listed as a state species of concern (*Perognathus inornatus psammophilus)*. This tawny mouse occurs in dry, open grasslands or scrub habitat on fine-textured soils between 1200 and 2000 feet in elevation (Zeiner et al., 1990). The mouse feeds on seeds, insects, and green plant parts. It probably has lost habitat because of widespread land development for agriculture and urban development. Plowing and soil ripping for agriculture collapse burrows and remove the fine sands and native plants these animals need. There is relatively little information about the present distribution of the species, and it is difficult to distinguish among the subspecies. Therefore, impacts to these species are of concern to USFWS.

Known recent records of San Joaquin Pocket Mouse are located approximately 10 miles southwest of the project site, in the coastal foothills, at elevations closer to the 1200 to 2000 feet in elevation indicated in Zeiner et al. (1990). The project site and surrounding areas and linears are all less than 100 feet in elevation, which is well below the reported range for this species. Although the ecology and distribution of the mouse is poorly known, it is believed the species would be unlikely to be present out of its reported elevation range, and would be unlikely to survive in the developed agricultural lands surrounding the project site.

The Western pond turtle (*Clemmys marmorata*) is a species of concern that was proposed for federal listing. CNDDB records show a known occurrence at Mountain House Creek, approximately 4 miles southeast of the site and in Canal 70, approximately 1 mile southwest of the project site. This species could potentially occur in any open farm ponds or slow-moving waters in the vicinity. There are no suitable bodies of water on the project site. Any construction in the vicinity of farm ponds or large bodies of water should be considered with respect to avoiding potential impacts to pond turtles. No project features are expected to modify this kind of habitat.

Of the species listed in Table 8.2-1, only the California tiger salamander (*Ambystoma Californiense*) is categorized as a proposed or candidate species for federal listing. The California tiger salamander breeds in vernal pools and ephemeral ponds, and summers in animal burrows or soil crevices. The proposed project site has been leveled and cropped and supports no suitable ponds or wetlands suitable for breeding tiger salamanders. CNDDB records indicate the species occurring near the corner of Kelso and Bruns roads and localities generally west of there in the coastal foothills. Linear facilities on Kelso and Bruns roads would pass through potential tiger salamander habitat. To minimize the potential impact of the project to tiger salamanders, a pre-design field survey would be implemented to identify potentially suitable habitat and plan measures to avoid or minimize adverse impact to them.

8.2.1.4 Jurisdictional Wetlands and Waters of the United States

Wetlands are protected under specific regulations of the ACOE and CDFG and are important because they support the highest abundance and diversity of plant and wildlife

species in the project area. Some special-status species, such as red-legged frog and vernal pool crustacea are dependent on them.

As noted above, the project site supports no natural wetlands or potential wetlands. It is bordered on the east side by an irrigation ditch that drains farm fields from the south toward the Old River. The ditch has a very narrow band of hydrophytic vegetation, but is maintained frequently and lacks significant riparian or wetland vegetation.

The project site is crossed by three irrigation ditches, two of which are concrete lined. These ditches are seasonally dry and support no wetland vegetation.

Project linears cross significant wetlands and potential wetlands in the project vicinity, including the Delta-Mendota Canal, Canal 45, Mountain House Creek, several unnamed drainages, and scattered farm drainage ponds. Each of these features would be identified and avoided by project construction, or an appropriate permit for alteration would be secured from ACOE or CDFG as appropriate. Therefore, the project is not anticipated to adversely affect wetlands.

8.2.1.5 Recreational and Commercial Opportunities

The project site is on private property, located in the southern portion of the Sacramento-San Joaquin Delta region. The area supports upland game such as ring-necked pheasant, and is attractive to winter waterfowl. Numerous private hunting clubs are located within 10 miles of the project site, but the property under consideration has not been leased for hunting, and no refuges, parks, or similar land uses are nearby that would provide significant recreational or commercial opportunities for exploiting wildlife.

8.2.1.6 Biological Resources of Project Linears

The project would require that new pipelines be built to carry domestic and recycled water, and gas to the site. New electrical transmission lines mounted on towers or poles would run from the site to nearby powerlines. Cumulatively these are described and evaluated as the project "linears." The project linears cross habitat that is similar to that on the project site, and supports the same or similar species to those described for site impacts. However, linears also span a much larger area and have the potential to intersect specific features of biological importance. Such features would include wetlands and surface water features, unique habitat types, local populations of special-status species, or other individual features. Also, project linears may cause specific impacts because of their physical structure or characteristics (e.g., collision hazards from powerlines).

In selecting potential linear alignments, minimizing impacts to biological resources was a key selection criterion.

Water Supply Lines. There are three water supply linears to provide domestic, process makeup, and recycled water (when available) to the project site.

The domestic supply line would be located entirely on the project site and adjacent developed sites and affect only habitats and biological resources already described on the project site.

The process makeup water would be conveyed from the new pump station at Bruns Road and Canal 45 to the site by a buried pipeline. The alignment would cross primarily pastureland, a gravel farm road, and vineyards. It would cross the existing Canal 45 in the roadbed, and would either cross under the Delta-Mendota Canal (by HDD) or be in the Byron Bethany Road right-of-way, thus avoiding impacts to wetlands. Impacts to pastureland and open agricultural fields would be similar to those described for the project site. The alignments would be surveyed for potential occurrence of special-status plant and animal species, but based on the dominant habitat type (vineyards, row crops, and pasture), the potential for their occurrence is considered low.

Recycled water, when available, would be conveyed to the site by a buried pipeline from the as-yet-to-be-constructed MHCSD WWTP. The pipe would likely be sited in the disturbed right-of-way between Byron Bethany Road and the railroad or in agricultural fields south of Byron Bethany Road. The habitat in this area is similar to that described for the project site and supports similar species. As the right-of-way is highly disturbed, the habitat is dominated by ruderal grassland and weedy species that would characterize the edge zones of large agricultural parcels. There are two significant wetland areas in this alignment where Mountain House Creek and an unnamed drainage cross Byron Bethany Road (See Figure 8.2-1). The biological resources that could potentially occur along the linear alignment are the same as those that could occur on the project site. Site-specific surveys of this alignment would be implemented prior to construction to identify the location of sensitive species or habitats in the alignment, and implement measures to avoid impacts to them.

Gas Lines. Natural gas supply to the plant would be conveyed via buried pipeline between the project site and PG&E's main line, located approximately 1.5 miles west of the project. The proposed alignments cross primarily open agricultural fields, used for pasture and row crops that are similar to the habitat on the project site. Where the alignments cross BBID's Canal 45, there are scattered farm ponds and marshy areas in this area that would be potential habitat for red-legged frog. Where the alignments cross elevated berms around roads, or the Delta-Mendota Canal, conditions are attractive for burrowing owls and San Joaquin kit fox. These species are highly mobile, and may move into suitable burrows in any particular year. Site-specific surveys of this alignment prior to construction would be necessary to identify the location of sensitive species or habitats in the alignment, and to develop measures to avoid impacts to them.

Transmission Lines. Power from the new plant would be conveyed to the adjacent Tracy substation via an extension of the 230-kV lines that run south of Kelso Road, south of the project site. The connection would consist of approximately eight towers, with new wire that runs across the southern portion of the 174-acre parcel. Habitat affected by the new transmission towers would be row crop agricultural habitat. There is a small (2.2 acre_ tailwater pond south of Kelso Road that would be avoided by transmission towers.

8.2.2 Environmental Consequences

The following sections describe potential impacts to biological resources, with respect to direct, indirect, and cumulative effects.

8.2.2.1 Generating Facility Site

The proposed generating facility site would require up to a 55-acre footprint to support three combustion turbine generators equipped with dry, low NO_x combustors, a 19-unit mechanical evaporative cooling tower, HRSGs with three 175-foot-tall exhaust stacks, an STG, and associated support equipment. The Applicant is expected to begin construction of the EAEC facility in the second quarter of 2002 and begin operation in summer 2004.

Construction Impacts. Construction of the proposed generating facility would result in the following permanent and temporary impacts to biological resources on the 55-acre project site:

- Permanent impacts from construction of the project site, access road, and landscape corridor.
  - Permanent loss of 40 acres of agricultural field habitat under the plant footprint.
  - Permanent loss of approximately 2 acres of agricultural field for construction of the access road and visual screening landscape area.
  - Permanent loss of approximately 13 acres of agricultural fields for raw water, waste storage, and evaporation ponds.
- Permanent impacts from natural gas, water supply, and transmission lines.
  - Permanent loss of 0.1 acre of annual grassland in vicinity of gas compressor station and connection to PG&E main line.
  - Permanent loss of 0.2 acre of annual grassland to develop water supply pump station at Canal 45.
  - Permanent loss of 0.5 acre of agricultural land for footprint of up to eight new transmission towers.
- Temporary impacts from the construction laydown area, natural gas, water supply, and transmission lines.
  - Temporary disturbance of approximately 20 acres of agricultural field for the construction laydown area, and water supply line route. This area would be restored to agricultural use after construction.
  - Temporary disturbance of natural gas line construction area, 75 feet wide by 1.4 miles long, including two pads 100 by 115 feet for HDD staging areas.
  - Temporary disturbance of water supply line construction area, 75 feet wide by 2.4 miles long.
  - Temporary disturbance of transmission line construction area, including access road and laydown areas comprising 0.5 acre of agricultural land.

Permanent Impacts from Construction of the Project Site, Access Road, and Landscape Corridor.

Vegetation. Construction of the project site would result in the permanent loss of up to 55 acres of agricultural field habitat. This habitat type is regionally common, and the loss of 55 acres would not be considered individually significant. However, many wildlife species use agricultural habitat for foraging and nesting, and the loss of 55 acres would contribute incrementally to the losses experienced regionally.

Wildlife. Construction could displace wildlife species that forage in and near the agricultural fields, including long-billed curlews, raptors, and small mammals. The area could also be used by resident raptors such as burrowing owl, red-tailed hawk, white-tailed kite; migratory birds such as long-billed curlew and white crowned sparrow; and predatory mammals such as coyote. Although the loss of a small amount of foraging habitat would not be considered individually significant, losses associated with conversion would contribute to regional losses that could be cumulatively significant.

Special-Status Species. No threatened or endangered plants or animals were observed on the project site. However, habitat is suitable on the project site to support temporal use by San Joaquin kit fox, red-legged frog, Swainson's hawk, migratory birds, and small mammals. The conversion of this parcel from agricultural uses would not cause direct "take" of any special-status species. It would reduce incrementally the available foraging habitat for some species.

Temporary Impacts from the Construction Laydown Area, Natural Gas, and Water Supply Lines. Temporary impacts during construction include disturbance to soils and vegetation from construction of: (1) an equipment laydown area; and (2) trenches for gas supply and water supply. A total of 20 acres of open agricultural field north of the site will be temporarily disturbed for a construction laydown area. The laydown area will be compacted and overlain with a layer of gravel or other material. After laydown use is complete, the site would be returned to agricultural use.

Impacts of Water Supply, Natural Gas, and Electric Transmission Lines. For project linears, the temporary construction and laydown area would remain along the 25- to 75-foot construction right-of-way during the course of construction. The laydown area would serve as the location for storing pipe and other pipeline construction materials. Any additional storage would be located in existing paved or graveled areas along the pipeline route. Pipeline construction would take approximately 8 months and would occur from fall 2002 to spring 2003. After construction, the stockpiled topsoil would be returned to restore the natural contour, and allowed to revegetate to its pre-construction state.

Water Supply Line. The following sections describe potential impacts to biological resources from construction of the proposed water supply pipelines.

- **Wetlands.** The water supply pipeline is designed to avoid crossing wetland areas to the extent possible. Wherever waterways are crossed, the pipeline would be installed via HDD, or the waterway would be trenched when dry, and in compliance with conditions specified in an appropriate permit from CDFG and/or ACOE.

- **Wildlife**. Temporary impacts to wildlife could occur during construction of the water supply pipeline. Birds, small mammals, reptiles, and amphibians that forage in the agricultural fields or annual grassland areas could temporarily be displaced during construction activities. Plants that occur in the pipeline right-of-way would be removed prior to construction. As proposed, the impacts of habitat disturbance would be minimized by placing the pipeline under an existing dirt road in fields that are dominated by vineyards and agricultural production. Ground-dwelling animals could become trapped in uncovered trenches if the trenches were kept open at night or if suitable egress was not provided. Impacts to nesting birds could occur if construction activities took place in natural habitat during the nesting season.

- **Delta Fishes.** The project would use water delivered by BBID, which is diverted from the California Aqueduct. The Aqueduct is located in the Delta, which supports numerous fish of importance to sportfishermen and the wildlife resource agencies. This includes species such as winter run chinook, delta smelt, and Sacramento splittail that are protected by the ESA. The project would not adversely affect these species, primarily because the BBID diversion is downstream of the Skinner fish screen facility, and partly because under California water rights law, any impacts to species would be accommodated by changes in diversion by the junior water rights holders (in this case, the State and Central Valley Water Projects). A more detailed discussion of the obligations and policies of diversion is provided in Section 8.14.

- **Special-Status Species**. San Joaquin kit fox could potentially occur along the linear alignments. There have been no specific records of sightings or burrows along the linear alignments, but pre-design surveys will be implemented to be certain that waterline construction does not disturb an existing burrow or den. The water supply pipeline crosses primarily vineyard habitat, which is not desirable as a denning site for kit fox. The berm along the Delta-Mendota Canal is potential denning habitat, but pre-design surveys did not identify any potential burrows in this area. Specific environmental awareness, training, and monitoring measures will be implemented as determined in consultation with USFWS to avoid adverse impacts to kit fox.

- **Operation Impacts**. Operation of the water supply line would not cause impacts to biological resources unless a leak should occur. Leakage of the water supply pipeline could result in localized ponded water, which could impact both vegetation and animals.

- **Maintenance Impacts**. It is anticipated that the water supply line will be buried and not require surface disturbance for maintenance. Therefore, no significant impacts resulting from pipeline maintenance are expected.

- **Decommissioning Impacts**. Decommissioning of the water supply pipeline could involve digging the pipeline out of the ground. These activities would cause similar impacts as the construction impacts mentioned above. The pipeline could also be sealed and left in place, which would not cause impacts to biological resources.

Natural Gas Supply Line. The following sections describe potential impacts to biological resources from construction of the natural gas pipeline.

- **Wetlands**. The natural gas pipeline is designed to avoid crossing wetland areas to the extent possible. Wherever waterways are crossed, the pipeline would be installed via HDD, or the waterway would be trenched in compliance with conditions specified in an appropriate permit from CDFG and/or ACOE.

- **Wildlife**. Temporary impacts to wildlife could occur during construction of the gas pipeline. Birds, small mammals, reptiles, and amphibians that forage in the annual grassland areas along local roads could temporarily be displaced during construction activities. Ground-dwelling animals could become trapped in uncovered trenches if the trenches were kept open at night or if suitable egress was not provided. Impacts to nesting birds could occur if construction activities took place in natural habitat during the nesting season.

- **Special-Status Species**. San Joaquin kit fox could potentially occur along the linear alignments. There have been no specific records of sightings or burrows along the linear alignments, but pre-design surveys will be implemented to be certain that gasline construction does not disturb an existing burrow or den. Specific sensitivity, training, and monitoring measures will be implemented as determined in consultation with USFWS to avoid adverse impacts to kit fox. The HDD construction method, bore and jack, or trenching during a dry period would avoid sensitive wetlands that could support sensitive wetland plants, or red-legged frog.

- **Operation Impacts**. Operation of the gas pipeline would not cause impacts to biological resources unless a leak should occur. Leakage of the gas pipeline could result in a fire, which could impact both vegetation and animals.

- **Maintenance Impacts**. Maintenance of the gas pipeline may remove weedy annual grassland from the edge of Kelso Road, or Bruns Road, or agricultural crops from above the pipeline.

- **Decommissioning Impacts**. Decommissioning of the gas pipeline could involve digging the pipeline out of the ground. These activities would cause similar impacts as the construction impacts mentioned above. The gas pipeline could also be sealed and left in place, which would not cause impacts to biological resources.

Electric Transmission Line.

- **Construction Impacts**. Western personnel would connect the new electric transmission line to the existing powerlines as part of the EAEC project. Areas of approximately 500 feet square on the south side of the Western substation and the area under the towers would be temporarily disturbed by equipment (crane and flatbed) during connection activities. The towers will be sited in the agricultural field so that permanent losses of sensitive habitat do not occur.

- **Wetlands.** A small (0.2 acre) tailwater pond south of Kelso Road would be avoided by transmission line poles.

- **Vegetation**. The area around the transmission towers supports agricultural vegetation. Impacts to the habitat are expected to be minimal. No grading, blading, or other disturbance is necessary to complete the activities. Construction is expected to take less than one week and would occur during dry summer months when the soil is hard.

Because most of the plants are agricultural crops, it is expected that they would be restored in the next planting cycle.

- **Wildlife**. Wildlife that forages in the agricultural fields could be temporarily disturbed during the construction activities. Wildlife is expected to return to the forage areas after construction is complete.

- **Special-Status Species**. No special-status plant or animal species were observed in the agricultural areas of the project site or linears. Wetlands that could support aquatic species will be avoided. The temporary disturbance during construction is not expected to cause significant impacts to these species.

- **Operation Impacts**. The preferred electric transmission line is primarily within an agricultural area that supports foraging habitat for birds such as white-tailed kite, red-tailed hawk, and Swainson's hawk. Bird collisions with electric conducting wires occur when the birds are unable to see the lines, especially during fog and rain events and if flushed suddenly from the ground. Factors that affect the risk of collision include weather conditions, behavior of the species of bird, and design and location of the line. Large raptors and migratory birds are at risk of electrocution when they perch on power poles where conducting wires are closer together than their wingspan. To minimize potential impacts, the line would be developed with "raptor-friendly" conductor wires that are spaced wide enough apart to prevent electrocutions. With "raptor-friendly" design and because it is relatively short, operation of the overhead electric transmission line is not likely to significantly increase the potential for avian collisions or electrocutions.

- **Maintenance Impacts**. Maintenance of the electric transmission line could include routine onsite inspections and restringing of the wires. This could include walking and/or driving vehicles on the alignment that would temporarily disturb wildlife.

- **Decommissioning Impacts**. Decommissioning of the electric transmission line would involve removing the overhead lines. Decommissioning could involve temporary surface disturbance while working around the transmission tower. These activities would cause similar temporary impacts as the construction impacts mentioned above.

Standards of Significance

Impacts on biological resources are considered significant if one or more of the following conditions could result from implementation of the proposed project:

- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of a state- or federally-listed threatened or endangered species;

- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of special-status species, including fully-protected, candidate proposed for listing, species of special concern, and certain CNPS list designations;

- Substantial interference with the movement of any resident or migratory fish or wildlife species;

- Substantially diminish or reduce habitat for native fish, wildlife, or plants; or
- Substantial disturbance of wetlands, marshes, riparian woodlands, and other significant wildlife habitat.

Report Preparers

E.J. Koford prepared this biological analysis with the assistance of Mr. Richard Dwerlkotte and Mr. Russell Huddleston. Mr. Koford is a Certified Wildlife Biologist with a Master's degree in Ecology and a Bachelor's degree in Zoology, and more than 20 years of experience preparing environmental studies and reports for projects in California and other states. Mr. Dwerlkotte has a Bachelor's degree in Biology and more than 5 years of experience characterizing vegetative communities and identifying threatened or endangered plant species. Mr. Huddleston has a Bachelor's degree in Biology and more than 2 years of experience identifying plant species and vegetative communities. Their resumes are included in Appendix 8.2E.

8.2.3 Proposed Mitigation Measures

Plant and animal species listed as threatened or endangered have special requirements under the federal and California Endangered Species Acts (ESAs) when a project could affect them or their critical habitats. Permanent and temporary construction impacts are shown in Table 8.2-2. Mitigation/protective measures for biological resources, including special-status species, that could be affected by the EAEC project were developed through informal consultation and mitigation guidelines developed with the USFWS, CDFG, and San Joaquin Council of Governments. The list of contact persons for these resource agencies is found in Section 8.2.7. The mitigation/ protective measures will also reduce or eliminate impacts to other special-status species and species with recreational and commercial value occurring within the EAEC areas that do not have special protective requirements under the ESAs. Mitigation measures developed for unavoidable project impacts that eliminate and/or minimize impacts to less than significant are described in this section and will be detailed and expanded upon in the Biological Resources Mitigation Implementation Monitoring Plan (BRMIMP) that will be submitted to the CEC and natural resource agencies for approval.

8.2.3.1 Overall Project Construction

The following measures would be implemented in all EAEC construction areas:

- Provide worker environmental awareness training for all construction personnel that identifies the sensitive biological resources and measures required to minimize project impacts during construction and operation.
- Provide mitigation construction monitoring by a qualified Designated Biologist during construction activities near sensitive habitats.
- Prepare a BRMIMP that outlines how the applicant would implement the mitigation measures developed to ensure that any action authorized, funded, or carried out by state or federal lead agencies is not likely to jeopardize the continued existence of endangered or threatened species. The BRMIMP outline is presented in Appendix 8.2-H.

TABLE 8.2-2
Summary of Permanent and Temporary Project Impacts on Biological Resources During Construction.

Location	Project Work	Construction Zone Size	Time Requirements	Habitat Type	Sensitive Biological Resources	Estimated Impacts	
						Temporary	Permanent
Generating Facility Site	Grading for footprint construction	40 acres for site. Maximum site, landscaping and construction to be less than 55 acres.	2002	Agricultural and annual grassland	Loss of potential foraging habitat for SJ Kit fox and dispersal habitat for California Red-legged frog.	None	Loss of 40 acres of agricultural field. Maximum site, landscaping and construction to be less than 55 acres.
Construction laydown area	Construct compacted gravel pad	16 acres	Two years during construction 2001 through 2003	Disked former agricultural field	SJ Kit fox, foraging habitat for raptors	Temporary loss of raptor forage	None
Electric transmission connection	String electric transmission line, build new towers.	500-foot square area under towers, and temporary access road	Summer 2002	Agricultural and annual grassland, farm drain pond	SJ Kit fox, foraging habitat for raptors, wetland south of Kelso Road	Compaction and dust from vehicles, disturbance to potential foraging wildlife and wetland species	Loss of 500 square feet of agricultural habitat.
Natural gas pipeline	Horizontal directional drill (HDD), or jack and bore staging areas	Approx. 1650 feet long HDD, 100x150-foot HDD pad areas	Summer 2002	Agricultural fields, annual grassland, irrigation ditches, and roads	SJ Kit fox, California red-legged frog, burrowing owl, fish, migratory birds, raptor nesting	No waterway disturbance, disturbance of 0.5 acre of agricultural land	None
	Gas pipeline trench	Approx. 1.5 miles of trench, 4-foot wide, 6-foot deep, 75-foot construction zone	3 to 4 month during summer 2002	Agricultural fields, annual grassland, irrigation ditches, and road edges.	SJ Kit fox, California red-legged frog, burrowing owl, fish, migratory birds, raptor nesting	Disturbance of 1.5 acres of annual grassland and/or paved road	None
Water supply line and Recycled Water Line	Pipeline trench	2.0 miles (Water Supply) and 4.6 mile (recycled water) 4-foot wide, 4-foot deep trench, 75 feet wide construction zone	Summer 2002	Annual grassland and agricultural habitat along roadsides.	SJ Kit fox, California red-legged frog, burrowing owl, fish, migratory birds, raptor nesting	Disturbance of 25 acres of annual grassland, agriculture and paved road. Would cross several waterways, with potential to impact wetlands.	Less than 0.2 acre expected to be above-ground and exposed.

- Avoid sensitive habitats and species during construction by developing construction exclusion zones and silt fencing around sensitive areas.
- Conduct additional preconstruction surveys for sensitive species in impact areas during the spring before construction begins, especially near the Delta-Mendota Canal.
- Prepare construction monitoring and compliance reports that analyze the effectiveness of the mitigation measures.

8.2.3.2 Special Biological Resources

Specific mitigation/protective measures were developed to minimize project impacts for the sensitive habitats potentially occupied by San Joaquin kit fox and red-legged frog. A formal consultation with USFWS under Section 7 of the ESA will be completed by the applicant and a biological opinion issued by USFWS prior to construction. The applicant agrees to abide by the conditions of the Section 7 permit, which include the following additional mitigation/protective measures that would be implemented in these sensitive areas. The applicant also agrees to implement the measures listed below for protection of burrowing owls that may occur in the general project vicinity also.

San Joaquin Kit Fox:

1. Protocol-level surveys in summer 2001, at locations identified by the USFWS as being occupied by kit fox, and potentially affected by the project.
2. Obtain and comply with the conditions of a Section 7 authorization for incidental take of this species.
3. Set and enforce speed limits in the construction area at 20 miles per hour or less.
4. Provide any excavations or ditches with escape ramps and check for trapped wildlife before work commences each day.
5. Cap pipes over 4 inches in diameter or check before they are moved.

California Red-legged Frog:

1. Conduct preconstruction surveys in the spring (before February 1) of the project site and project linears to determine if suitable habitat may be occupied.
2. Avoid all suitable breeding habitat if feasible.
3. If suitable breeding habitat cannot be avoided, implement measures to temporarily relocate frogs or other measures as required by USFWS.

Swainson's Hawk:

1. Implement nest surveys within ½ mile of project features to determine use by Swainson's hawk.
2. If project features are within ½ mile of Swainson's hawk nesting, avoid construction within ½ mile during nesting season if feasible.
3. If construction cannot avoid active nests by ½ mile, project applicant will apply for and comply with an incidental take agreement under Section 2080.1 for Swainson's hawk.

Burrowing Owl:

1. Conduct preconstruction surveys in the spring (before February 1) of construction areas to determine if habitat is occupied by burrowing owls.
2. Implement mitigation measures that protect burrowing owls by passive relocation and/or restriction of construction activities within 150 feet during non-breeding season or 250 feet of active burrowing owl nest burrow during breeding season (February 1 through August 31).
3. Incorporate areas in landscape/mitigation corridor for forage and potential burrow habitat.

Foraging Raptors, Herons, Egrets, and Waterbirds:

1. Design "raptor-friendly" electric transmission lines as described in the "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996" (APLIC, 1996).
2. Provide safety lighting that points downward on the HRSG stacks to reduce avian collisions.

8.2.3.3 Construction Impacts

Approximately 25 acres of roadside grassland and open agricultural fields would be disturbed during construction of the water supply line. The preferred water supply line corridor would be restored to its preconstruction condition and no ongoing impacts to wildlife are expected.

Construction materials and equipment would be delivered to the site and laydown area by truck from existing roads. No additional impacts to wildlife from deliveries are anticipated.

8.2.3.4 Operation Impacts

Operation of the proposed project might have the following impacts on biological resources on the site and adjacent areas:

- Cooling tower drift may affect local vegetation
- HRSG emissions on vegetation community
- Cooling tower effluent
- Avian collisions with the HRSG stacks
- Noise and lights from plant operations

Cooling Tower Drift. Cooling tower drift is the fine mist of water droplets that escapes the cooling tower and is emitted into the atmosphere. The proposed project would require a 19-cell mechanical-draft cooling tower unit to disperse waste heat from the steam cycle. The cooling towers would be located across the center of the site (Figure 2.2-1).

Maximum cooling tower drift from the cooling tower would be 0.0005 percent of the circulating water flow. Cooling water would be emitted as mist with a peak hourly rate of 85 gallons per hour during 98°F air temperatures. The cooling tower drift would evaporate quickly during the day and moisture could linger for a small portion of the 24-hour day (night) around the cooling towers. This low amount of moisture from the cooling towers is not expected to change the microclimate of the area. The noncriteria pollutants in the

cooling tower water include ammonia, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc at levels that will not affect biota in the project vicinity.

Cooling towers concentrate the particulates (total dissolved solids) during the cooling process and produce a salt mist. The deposition of dissolved solids can cause damage to vegetation if they are in concentrations that affect the physiology of the plants. Salts can physically damage the cells of leaves, especially on young plants, which can affect the photosynthetic ability of the plant. Physical mechanisms include the blocking of stomata so that normal gas exchange is impaired, as well as potential effects on leaf adsorption and reflectance of solar radiation. These physiological and physical effects could reduce crop productivity in sensitive plant species within a deposition area with high concentrations.

Studies performed by Pawha and Shipley (1979) exposed vegetation (corn, tobacco, and soybeans) to varying salt deposition rates to simulate drift from cooling towers that use saltwater (20 to 25 parts per thousand) in the circulation water. Salt stress symptoms on the most sensitive crop plants (soybeans) were barely perceptible at a deposition rate of 2.98 grams per square meter per year (g/m^2/year) (Pawha and Shipley, 1979).

The maximum annual predicted deposition for PM_{10} from the project (including cooling towers) is 0.6 micrograms per cubic meter ($\mu g/m^3$). Assuming a deposition velocity of 2 centimeters per second (cm/sec) (worst-case deposition velocity as recommended by the California Air Resources Board [CARB]), this concentration converts to an annual deposition rate of $0.4 g/m^2$/year. This calculated deposition rate for the PM10, including cooling tower drift is approximately one order of magnitude below the deposition rate that was shown to cause barely perceptible vegetation stress from salt mist ($2.98 g/m^2$/year) in the most sensitive plants. This conservative estimate of deposition and the fact that the EAEC cooling towers will use freshwater makes this estimate highly conservative in that it greatly overstates expected exposures.

The area of maximum impact for the cooling tower drift would be east and southeast of the proposed project, onto the area proposed for evaporation ponds. Cooling tower drift is not expected to have any significant impact on vegetation in surrounding areas within the maximum impact radius for the cooling tower drift.

HRSG Emissions. Air emissions from the two HRSG stacks include NO_x, sulfur oxides (SO_x), and PM_{10}. Nitrogen oxide gases (NO, NO_2) convert to nitrate particulates in a form that is suitable for uptake by most plants. Increased nitrate availability could adversely effect vegetation communities adapted to low nutrients. However, because the project area is surrounded by agricultural uses, the impacts are expected to be less-than-significant.

Nitrogen dioxide is potentially phytotoxic, but generally at exposures considerably higher than those resulting from most industrial emissions. Exposures for several weeks at concentrations of 280 to 490 $\mu g/m^3$ can cause decreases in dry weight and leaf area, and 1-hour exposures of at least 18,000 $\mu g/m^3$ are required to cause leaf damage. The predicted maximum EAEC emissions of NO_X impacts of 0.80 $\mu g/m^3$ are far below these threshold limits. In addition, the total predicted maximum 1-hour NO_X concentrations of 72.6 $\mu g/m^3$ (with infrequent concentrations of 204.7 $\mu g/m^3$ during emergency and test operations) would be significantly smaller than the 1-hour threshold (7,500 $\mu g/m^3$ or 3,989 parts per million (ppm) for 5 percent foliar injury to sensitive vegetation (U.S. Environmental Protection Agency [USEPA], 1991). This indicates that NO_X emissions from the EAEC, when considered in the absence of other air pollutants, would not adversely affect the physical functions of plants in the area.

Cooling Tower Effluent. Cooling tower effluent (blowdown) is the water that is discharged after it has cycled through the cooling towers. The EAEC discharge will concentrate particulates that produce calcium salts, thereby increasing the salinity of the discharge water. The cooling tower effluent would be recycled and treated (see Section 2.0) before discharge to an onsite pond for evaporation. The waste discharge is a high salinity brine (150,000 mg/L TDS). The pond would be required to be lined, and thus would support no wetland vegetation. The pond perimeter would also be fenced, and covered with parallel wire or monofilament barriers to discourage any birds or wildlife from entering the ponds. No discharge would be emitted from the ponds.

Avian Collisions. Bird collisions with HRSG stacks occur when the birds are unable to see the stacks during fog and rain events or during migration when they typically fly at night. Factors that affect the risk of collision include weather conditions, behavior of the species of bird, and location of the stacks. The agricultural fields adjacent to the project site are potential forage habitats for golden eagle, Canada geese, resident raptors, herons, and egrets, and special-status birds such as Swainsons hawk and peregrine falcon. The HRSG stacks and new electric transmission line could result in increased bird collisions in the area.

Noise and Lights from Plant Operations. Agriculture uses surround the EAEC site. Operation of the plant would produce some noise as described in Section 8.5. Noise and construction activities could temporarily prevent wildlife from foraging and nesting in the project area and adjacent areas. However, noise from long-term operations would not adversely impact wildlife, as they usually become accustomed to routine background noise.

Bright night lighting could disturb wildlife such as nesting birds, foraging mammals, and flying insects. Night lighting is also suspected to attract migratory birds to areas, and if the lights are on tall buildings or HRSG stacks, collisions could occur. To reduce these effects, lighting, if required, would be pointed down to minimize impacts.

Maintenance Impacts. Maintenance activities on the EAEC site include keeping vegetation clear of the fenceline for fire control. An area approximately 10 feet wide around the fenceline will be kept mowed.

Decommissioning Impacts. Decommissioning of the EAEC and supporting facilities could return grassland and agricultural lands to the area, depending on the LORS existing at that time. This could increase habitat for raptors and other wildlife. However, it is not yet known

what would occur on the site after decommissioning. Potential effects would be addressed in appropriate environmental documents at a time closer to the decommissioning process. Decommissioning of the temporary construction laydown area would occur as soon as feasible after construction was complete.

8.2.3.5 Proposed Mitigation for EAEC Linear Corridors

Natural Gas and Water Supply Pipelines.

Construction Impacts. Construction of the natural gas pipeline would result in temporary impacts to biological resources within portions of the construction corridor. Measures previously identified for project construction would apply similarly to project linears. Specifically:

1. All project linears would be surveyed prior to construction to identify significant biological resources that require avoidance or protection.
2. Avoidance, protection and worker awareness training would be detailed in the project Biological Resources Management and Implementation Plant (BRMIMP) (See Appendix 8.2F).
3. Construction would be constrained within a designated construction corridor, generally 75 feet wide or less.
4. Any wetlands crossed by project linears would be avoided, or crossed in compliance with conditions specified by a Section 404 Permit or Streambed Alteration Agreement, as appropriate.
5. Construction site would be restored to pre-existing contours and re-vegetated after construction.

Vegetation. Vegetation would be removed in the course of trenching along the pipeline. Most of the habitat disturbed would be annual grassland and weeds occurring along roadsides, but some agricultural fields could also be trenched. After construction, the trench would be backfilled with the excavated soil and restored to pre-construction conditions, both with respect to contour and vegetation.

Wildlife. Impacts to wildlife from linear corridor construction would be mitigated through the measures specified above, including pre-construction surveys, avoidance, and restoration. After mitigation, the habitat should provide the same support of wildlife as prior to linear installation.

Special-Status Species. Impacts to special-status species from linear corridor construction would be mitigated through the measures specified above, including pre-construction surveys, avoidance, and restoration. After mitigation, the habitat should provide the same support of special-status species as prior to linear installation.

8.2.4 Cumulative Impacts

Cumulative impacts refers to the impacts of the proposed project, when considered in conjunction with the cumulative impacts of this and other reasonably foreseeable projects. The proposed project is considered a temporary measure to avoid a power generation

shortfall that has been predicted. The addition of the proposed power generation would avoid shortfalls that could negatively impact industrial and residential supplies, but would not cause significant adverse effects when considered in conjunction with other projects.

The EAEC project will convert up to 55 acres of agricultural field to utility uses. This is the general trend in the region, and it incrementally reduces the value of habitat available to native wildlife species throughout the state. The incremental loss is slight in this case, as the habitat onsite are in a degraded condition and provide low to moderate habitat value for most species in the area.

The increase in vehicle traffic as a result of the proposed EAEC project will increase incrementally the number of wildlife that will be killed on roadways leading to and from the site.

The EAEC project would not result in significant impacts to special-status plants, natural plant communities, wetlands, and associated habitat values for wildlife. The project proposes to mitigate potential adverse impacts to wildlife through avoidance, or through reduction of impacts to a less than significant level for key wildlife resources such as wetlands and habitat for special-status species such as San Joaquin kit fox, California red-legged frog, California tiger salamander, burrowing owl, migratory fish, and migratory birds. The project is not expected to cause any significant cumulative impacts to biological resources.

8.2.5 Laws, Ordinances, Regulations, and Standards

LORS, including conformance to the LORS, are shown in Table 8.2-3. These LORS were reviewed and consultations with the appropriate agencies were made to determine if the proposed project could affect sensitive biological resources. Through the agency consultations, project modifications, and proposed mitigation measures, the project will conform to all applicable LORS for protection of biological resources. Table 8.2-3 describes the sensitive biological resources in the project area designated by federal, state, and regulatory agencies that could be affected by construction and operation of the project and its ancillary facilities.

8.2.6 Permits and Permitting Schedule

The project may be required to obtain several biological resources permits, authorizations, and agreements. Table 8.2-4 provides a list of permits and permit schedule.

TABLE 8.2-3
Laws, Ordinances and Regulations Applicable to East Altamont Biological Resources

LORS	Purpose	Regulating Agency	Permit or Approval	Applicability
Federal				
Endangered Species Act of 1973 and implementing regulations, Title 16 United States Code (USC) §1531 et seq. (16 USC 1531 et seq.), Title 50 Code of Federal Regulations (CFR) §17.1 et seq. (50 CFR 17.1 et seq.).	Designates and protects federally threatened and endangered plants and animals and their critical habitat.	USFWS and NMFS	Issues, Biological Opinion, or Authorization with Conditions after review of project impacts	Applicant will obtain Section 7 Permit for red-legged frog and San Joaquin kit fox, if required.
Section 10(1)(A) of the ESA	Requires a permit to "take" threatened or endangered species during lawful project activities. If no federal nexus for project, a Habitat Conservation Plan (HCP) may be necessary.	USFWS	USFWS issues a Section 10(1)(A) Federal Fish and Wildlife Permit and/or HCP approval	Section 7 will apply instead of Section 10.
Section 404 of Clean Water Act of 1977	Requires permit to fill jurisdictional wetlands.	USACE	Section 404 Permit	Applicant will obtain if required.
Section 401 of Clean Water Act of 1977	Requires the applicant to conduct water quality impact analysis for the project when using 404 permits and for discharges to waterways.	CRWQCB	Water Quality Certification	Applicant will obtain 401 Certification if required.
Suggested Guidelines for Raptor Protection (APLIC, 1996)	Describes design measures to avoid and reduce impacts to raptors from electrical transmission and other facilities.	CEC	CEC Conditions of Approval	Applicant will implement design measures to protect raptors from collision and electrocution.
Migratory Bird Treaty Act 16 USC §§703-711	Prohibits the non-permitted take of migratory birds.	USFWS and CDFG	CEC Conditions	Applicant will avoid take.
State				
California Endangered Species Act of 1984, Fish and Game Code, §2050 through §2098.	Protects California's endangered and threatened species.	CDFG	Issues Biological Opinion or Authorization with Conditions after review of project impacts.	Applicant will obtain permit if required.
Title 14, California Code of Regulations (CCR) §§670.2 and 670.5.	Lists plants and animals of California declared to be threatened or endangered.	CDFG	N/A	

TABLE 8.2-3
Laws, Ordinances and Regulations Applicable to East Altamont Biological Resources

LORS	Purpose	Regulating Agency	Permit or Approval	Applicability
Fish and Game Code Fully Protected Species. §3511: Fully Protected birds §4700: Fully Protected mammals §5050: Fully Protected reptiles and amphibians §5515: Fully Protected fishes	Prohibits the taking of listed plants and animals that are Fully Protected in California.	CDFG	N/A	Applicant will avoid take.
Fish and Game Code §1930, Significant Natural Areas(SNA)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitats. Listed in the CNDDB.	CDFG		Applicant will avoid SNA
Fish and Game Code §1580, Designated Ecological Reserves	The CDFG commission designates land and water areas as significant wildlife habitats to be preserved in natural condition for the general public to observe and study.	CDFG		Applicant will avoid.
Fish and Game Code §1600, Streambed Alteration Agreement	Reviews projects for impacts on waterways, including impacts to vegetation and wildlife from sediment, diversions, and other disturbances.	CDFG	Issues conditions of the Streambed Alteration Agreement that reduces and minimizes effects on vegetation and wildlife	Could be required to cross Mountain House Creek.
Native Plant Protection Act of 1977, Fish and Game Code, §1900 et seq.	Designates state rare and endangered plants and provides specific protection measures for identified populations.	CDFG	Reviews mitigation options if there will be significant project effects on threatened or endangered plant species	No rare or endangered plants in area.
Public Resource Code §§25500 & 25527	Siting of facilities in certain areas of critical concern for biological resources, such as ecological preserves, wildlife refuges, estuaries, and unique or irreplaceable wildlife habitats of scientific or educational value, is prohibited, or when none alternative, strict criteria is applied.	USFWS CDFG	Issues Biological Opinion or Authorization with Conditions after review of project impacts	No areas of critical biological concern in area.

TABLE 8.2-3
Laws, Ordinances and Regulations Applicable to East Altamont Biological Resources

LORS	Purpose	Regulating Agency	Permit or Approval	Applicability
Title 20 CCR §§1702 (q) and (v); and	Protects "areas of critical concern" and "species of special concern" identified by local, state, or federal resource agencies within the project area, including the CNPS.	USFWS CDFG	Issues Biological Opinion or Authorization with Conditions after review of project impacts.	No areas of critical concern in area.
Title 14 CCR Section 15000 et seq.	Describes the types and extent of information required to evaluate the effects of a proposed project on biological resources of a project site.	USFWS CDFG	Review and comment on AFC.	AFC will provide this information.

TABLE 8.2-4
Permits and Permit Schedule for EAEC Biological Resources

Permit/Authorization	What is Required to Complete Consultations	Date Application Submitted
USFWS Biological Opinion/Authorization	Formal consultation to determine if effects of EAEC could result in "take" of special-status species. Prepare Biological Assessment to initiate formal consultation if needed.	1 year before construction
CDFG Memorandum of Understanding/Authorization	Complete informal consultation for California listed species and Species of Special Concern, include 2080.1, if required	1 year before construction
Alameda County Approval of Construction Plans	Submit construction plans and receive feedback	60 days before construction
CDFG Streambed Alteration Agreement for water crossings at Mountain House Creek or unnamed drainages	Prepare application that clearly identifies areas of impact and measures to protect vegetation and wildlife downstream of construction.	April 2002
Water Quality Certification	Prepare application that describes monitoring plan for water quality of stormwater discharge, requires completed endangered species consultations and CDFG streambed alteration agreement.	April 2002
Clean Water Act Section 404 Permit (potential)	If construction affects wetlands, prepare 404 application	April 2002

8.2.7 Natural Resource Agency Contacts

Table 8.2-5 lists the persons contacted at the natural resources agencies involved with the project or resources within the project area.

TABLE 8.2-5
Contacts for the East Altamont Energy Center Project

Biological Resource Agency	Person Contacted	Issue	Phone
U.S. Fish and Wildlife Service	Sheila Larsen	Federal threatened or endangered species	916/414-6000
U.S. National Marine Fisheries Service	William E. Hearn	Delta Fishes	707/944-550
California Department of Fish and Game	Janis Gann	California Wildlife	209/835-6910
California Department of Fish and Game	Dan Gifford	California threatened or endangered species	209/369-8851
California Department of Fish and Game	Joseph Powell	Streambed Alteration Agreement	707/944-5500
U.S. Army Corps of Engineers	Nancy Haley	Waters of the U.S. and wetland impacts	916/557-7772
County of Alameda Public Works Agency.	John Rogers	Encroachment Permits	510/670-5429
Contra Costa County Planning Department	Bob Hendry	Encroachment Permits	916/335-1375
San Joaquin Planning Department	Jeff Fischer	Encroachment Permits	209/468-2193

8.2.8 References

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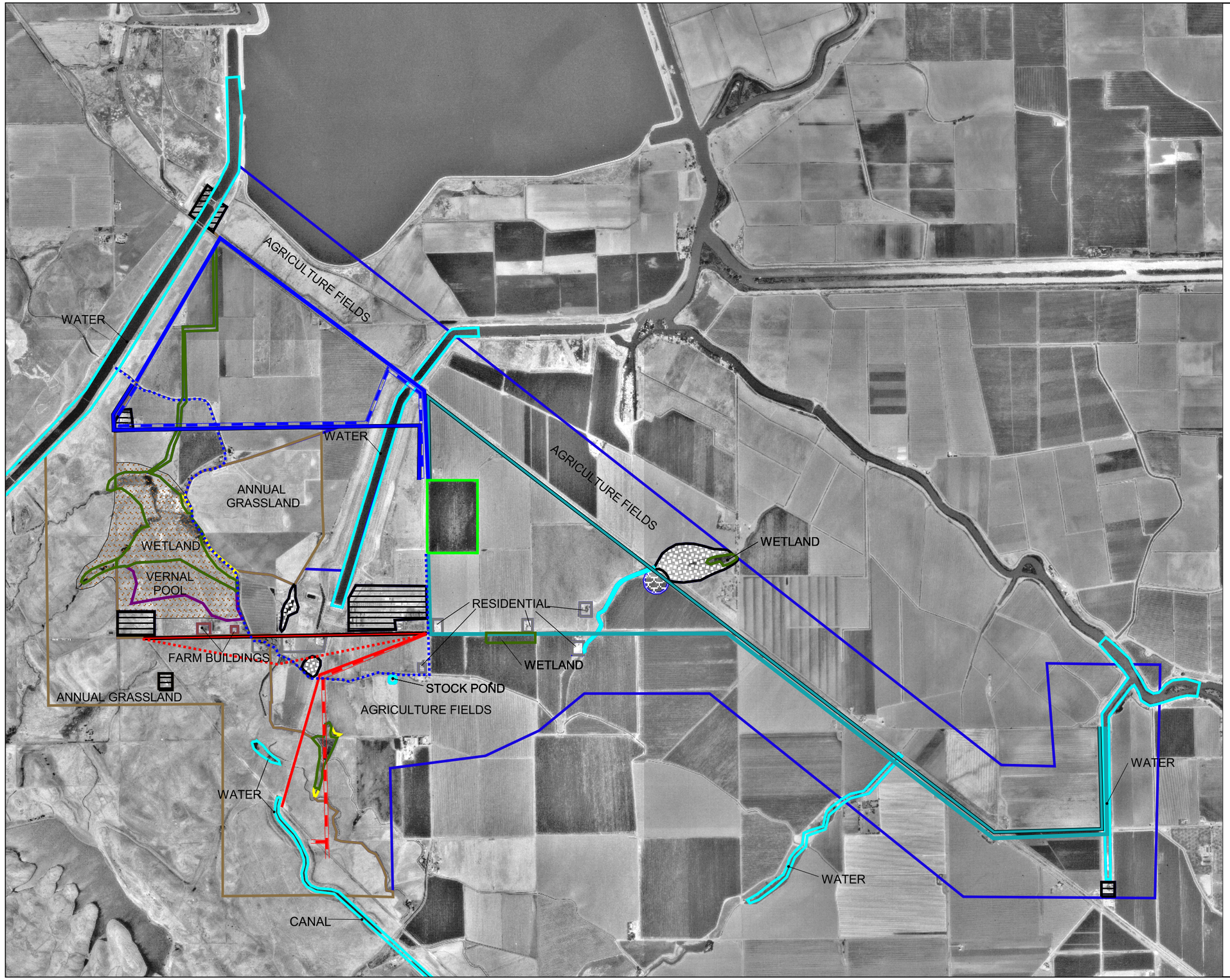
Zeiner, David C., et al; 1990b. California's Wildlife, Vol. III: Mammals; California Dept. of Fish and Game.



LEGEND

- AGRICULTURE FIELD
- WET MEADOW
- ANNUAL GRASSLAND
- WETLAND
- VERNAL POOL
- WILLOWS
- OAKS AND WILLOWS
- FARM BUILDINGS
- INDUSTRY
- RESIDENTIAL
- WATER/CANALS
- ALKALI SOILS
- PROJECT SITE

GAS
- 2A PREFERRED
- 2C
- 2D
- 2E

WATER
- 3A
- 3B
- 3D
- 3E PREFERRED

RECLAIMED WATER
- 4A
- 4B PREFERRED

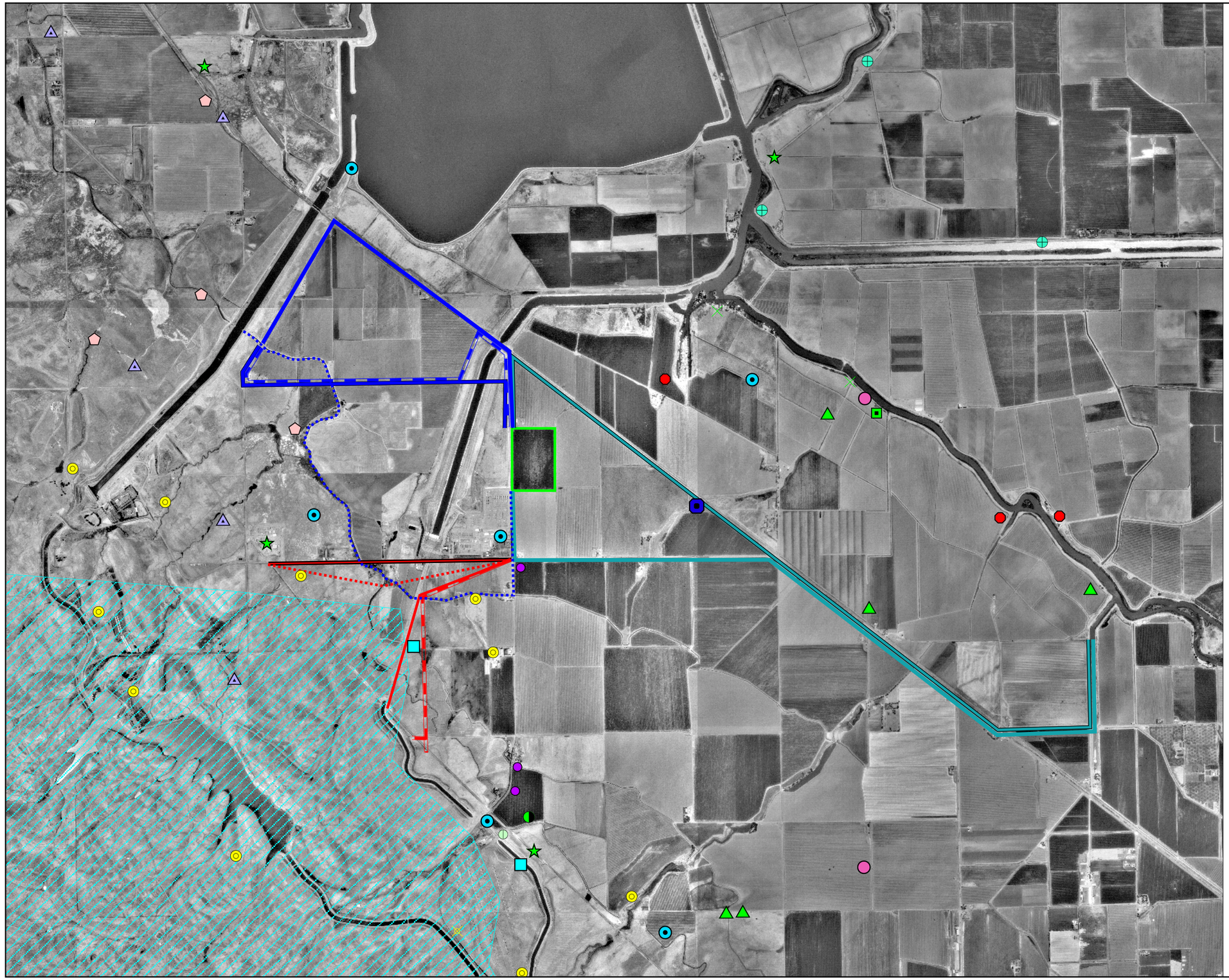
N

2000 0 2000 Feet

SCALE IS APPROXIMATE

FIGURE 8.2-1
BIOLOGICALLY SENSITIVE RESOURCES
APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL



LEGEND

- PROJECT SITE
- BURROWING OWL SIGHTING
- CURVE-FOOTED HYGROTUS DIVING BEETLE SIGHTINGS
- KIT FOX OCCURENCE RECORDS
- KIT FOX SIGHTING BY MCGINNIS IN 1992
- POTENTIAL KIT FOX DEN
- POTENTIAL KIT FOX SCATS
- RED-LEGGED FROG SIGHTINGS
- SWAINSON'S HAWK NEST LOCATION 1989 (EIP,1989)
- SWAINSON'S HAWK
- WESTERN POND TURTLE
- ROSE MALLOW
- TIGER SALAMANDER
- RECURVED DELPHINIUM
- MASONS LILAEOPSIS
- ALKALI VERNAL POOLS
- SAN JOAQUIN SALTBUSH
- FERRIS MILKVETCH
- CAPER-FRUITED TROPIDOCARPUM
- RED-LEGGED FROG RECOVERY PLAN "CORE" AREA

GAS
- 2A PREFERRED
- 2C
- 2D
- 2E

WATER
- 3A
- 3B
- 3D
- 3E PREFERRED

RECLAIMED WATER
- 4A
- 4B PREFERRED

N

2000 0 2000 Feet

SCALE IS APPROXIMATE

SOURCE: BASELINE, 1994; BIOSYSTEMS, INC., 1992

FIGURE 8.2-2
SENSITIVE BIOLOGICAL SPECIES RECORDED IN PROJECT AREA

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

8.3 Cultural Resources

Cultural resources are historic and prehistoric archaeological sites, historic architectural and engineering features and structures, and sites and resources of traditional cultural significance to Native Americans and other groups. Section 8.3.1 describes the cultural resources environment that could potentially be affected by construction of the EAEC project. Section 8.3.2 discusses the environmental consequences of construction of the proposed plant site and linear corridors. Section 8.3.3 determines if there any cumulative effects from the project. Section 8.3.4 presents mitigation measures that will be implemented to avoid impacts from construction of the proposed plant site and linear corridors. Section 8.3.5 discusses the LORS applicable to the protection of cultural resources. Section 8.3.6 lists the agencies involved and agency contacts. Section 8.3.7 discusses permits and permitting schedule, and Section 8.3.8 lists the references used in preparation of this section.

This study determines whether cultural resources are present and whether they could be affected adversely by the EAEC project. The significance of any potentially affected resources is assessed and measures are proposed to mitigate potential adverse project effects. This study was directed by Dr. James C. Bard, who meets the *Standards and Guidelines for Archaeology and Historic Preservation* (National Park Service, 1983) and this study was performed consistent with CEQA compliance procedures and Section 106 of the National Historic Preservation Act (NHPA) set forth at 36 CFR 800. This section of the AFC was prepared by Dr. Bard and Mr. Robin McClintock. The study scope was developed in accordance with the CEC's *Instructions to the California Energy Commission Staff for the Review of and Information Requirements for an Application for Certification* (CEC, 1992) and *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 1997).

Significant cultural resources (as defined for federal undertakings) include those prehistoric and historic sites, districts, buildings, structures, and objects, as well as properties with traditional religious or cultural importance to Native Americans or other groups, which are listed, or are eligible for listing, on the National Register of Historic Places (NRHP), according to the criteria outlined in 36 CFR 60.4. Cultural resources that do not meet the NRHP criteria but may qualify as a unique characteristic of an area are considered under NEPA, and resources that may qualify for the California Register of Historic Resources (CRHR) are considered under CEQA. Any substantial adverse change in the significance of a historical resource listed in or eligible to be listed in the CRHR is considered a significant effect on the environment.

Impacts to cultural resources would result from activities that affect the characteristics that qualify a property for the NRHP or substantially adversely change the significance of a resource that is qualified to be listed in the CRHR. Therefore, impacts to cultural resources from the proposed project will be considered significant if the project would:

- Physically destroy or damage all or part of a property;
- Change the character of the use of the property or physical features within the setting of the property that contribute to its historic significance; or
- Introduce visual, atmospheric, or audible elements that diminish the integrity of the significant historic features of a property.

With the exception of isolated artifacts or features that appear to lack integrity or potentially important information, all new cultural resource findings will be treated as though they were eligible for the NRHP/CRHR. If possible, all recorded resources would be avoided completely. However, if avoidance is not possible through project redesign, the significance of the affected resources would be evaluated formally using NRHP/CRHR and/or CEQA criteria and guidelines. If a resource is determined to be significant, a data recovery program or some other appropriate mitigative effort would be undertaken in consultation with the CEC.

If the EAEC project becomes subject to federal agency involvement (permitting, licensing, etc.), additional federal authorities related to cultural resources may be triggered. These may include the National Environmental Policy Act (NEPA) and the Archaeological and Historic Preservation Act (AHPA) of 1974 (16 USC 469), among others.

The AHPA includes requirements to coordinate with the Secretary of the Interior for notification, data recovery, protection, and/or preservation when a federally licensed project may cause the irreparable loss or destruction of significant scientific, prehistoric, historic, or archaeological data. In 1983, the Secretary of the Interior established standards for gathering and treating data related to cultural resources in *Standards and Guidelines for Archaeology and Historic Preservation.*

8.3.1 Affected Environment

Cultural resources are traces of human occupation and activity. In Northern California, cultural resources extend back in time for at least 11,500 years. Written historical sources tell the story of the past 200 years. Archaeologists have reconstructed general trends of prehistory. A cultural resources field inventory of the project area located potentially significant cultural resources within the project's Area of Potential Effect (APE). Contact with the Native American Heritage Commission (NAHC) did not result in the identification of traditional cultural properties in the project area.

Previous cultural resource studies conducted within a 1.0-mile radius of the EAEC and its associated proposed alternative corridors were reviewed. A discussion of the cultural resources sites in conflict with, or in potential conflict with, project elements (plant site, transmission lines, etc.) are addressed in Section 8.3.1.5. The elements included in the proposed EAEC are described in Section 2.0, Project Description, and shown on Figure 2.1-1. The APE is defined as an area within a 1.0-mile radius of the EAEC, or 1,000 feet of any facility.

8.3.1.1 Natural Environment

The EAEC project is located near the point where Alameda, Contra Costa, and San Joaquin counties meet, west of Mountain House Road and south of Byron Bethany Road, immediately west of the Tracy substation and south of the Clifton Court Forebay. This rural agricultural area is expected to experience rapid residential and commercial development as the planned community of Mountain House is built over the next several years.

The EAEC project area elevations range from sea level at the northwest end to about 140 feet above sea level near Mountain House Creek on the southern end. The topography is essentially flat and virtually all of the land in the vicinity is currently agricultural (or being

converted to residential land use patterns). The dominant hydrological feature is Old River, which is an important tributary to the San Joaquin River. Much of the Old River near the project area has been channelized. Mountain House Creek bisects part of the project area as it crosses Byron Bethany Road south of Kelso Road; it drains into the Old River. Much of the region adjacent to the Old River was probably wetlands or marsh; areas further from the river were probably grasslands, as shown on Figure 8.3-1. (All figures are located at the back of the section.) Today little native vegetation remains. As shown by recent archaeological research, the project area provided a favorable environment for human occupation with riparian/marsh-wetland and inland resources readily available and the rich natural resources of the San Joaquin River Delta in relative proximity.

Sections 8.9 and 8.15 of this AFC provide detailed descriptions of regional soil conditions and geology, respectively. Some of the cultural resources in the area have been disturbed or eliminated by past agricultural practices and urban development characteristic of late 20th century population growth of Delta towns and cities as bedroom communities to major San Francisco Bay Area cities. Overall, the immediate project area is one of low to moderate archaeological sensitivity that is embedded within the larger San Joaquin Delta region, which is of moderate to high archaeological sensitivity.

8.3.1.2 Prehistoric Background

The EAEC project area lies within the historic Tulares or "Great Tule Swamp." This formerly marshy region provided a favorable environment for human occupation during the prehistoric period (Cook and Elsasser, 1956:31). Local Indian inhabitants had easy access to the San Francisco Bay to the north, the confluence of the Sacramento and San Joaquin rivers, the freshwater Old and Middle rivers, and various sloughs offering resources for subsistence and manufacture as well as providing travel vectors to the interior and bay.

Cook and Elsasser (1956), Heizer (1954), Bennyhoff (1977), and Cook and Heizer (1962) summarized aspects of Delta area prehistory (for areas to the north of the EAEC project). Low mounds or sand islands throughout the tule marshes would have been excellent temporary occupation or village sites and suitable cemetery areas as well (Desgrandchamp and Chavez, 1984:14-17). Frequent and random accidental exposure of prehistoric Native American artifacts, sites, and skeletal remains in the Delta during levee building, land leveling, or ditching operations-coupled with the known historic era Native American population density-suggest that many unrecorded sites may be present in the region (Cook and Elsasser, 1956:32; Desgrandchamp and Chavez, 1984:16; Bickel, 1978a,b; and Moratto et al., 1988, 1990).

Watercourses in the immediate project area, such as Old River, Mountain House Creek, and the former wetlands and marshes that once characterized the vicinity prior to Euroamerican settlement (see Figure 8.3-2), were locations that favored prehistoric occupation in what now appears to be a large flat expanse of grasslands just east of the foothills behind the Delta-Mendota Canal. From such spots, Native Americans could have exploited one or more ecological niches on the alluvial plain and nearby foothills or the rich ecological niches associated with the rivers, streams, and sloughs of the Delta itself. Archaeologists believe that the population of the prehistoric San Francisco Bay Area slowly increased from the

Early to the Late Horizon time periods (see below). The population increase is thought to reflect more efficient resource procurement, increased ability to store food at village locations, and the development of increasing political complexity.

Prior to about 5,000 to 7,000 years ago, Native American occupation of the San Francisco Bay Area was intermittent and sparse. Evidence for early occupation along the bayshores was hidden by rising sea levels from about 15,000 to 7,000 years ago, or was buried under sediments caused by bay marshland infilling along estuary margins from about 7,000 years onward (cf. Moratto, 1984). Early occupants concentrated on hunting and gathering various plant foods and collecting shellfish.

A three-part cultural chronological sequence, the Central California Taxonomic System (CCTS) was developed by archaeologists to explain local and regional cultural change in prehistoric central California from about 4,500 years ago to the time of European contact (cf. Lillard, Heizer, and Fenenga, 1939; and Beardsley, 1948, 1954).

In 1969, several researchers met at UC Davis and worked out substantive taxonomic problems that had developed with the CCTS. Table 8.3-1 summarizes David Fredrickson's (1994) cultural periods model and provides CCTS classification nomenclature (such as "Early Horizon," etc).

TABLE 8.3-1
Hypothesized Characteristics of Cultural Periods in California

1800 A.D. Upper Emergent Period Phase 2, Late Horizon	Clam disk bead money economy appears. More and more goods moving farther and farther. Growth of local specializations relative to production and exchange. Interpenetration of south and central exchange systems.
1500 A.D. Lower Emergent Period Phase 1, Late Horizon	Bow and arrow introduced, replace atlatl and dart; south coast maritime adaptation flowers. Territorial boundaries well established. Evidence of distinctions in social status linked to wealth increasingly common. Regularized exchanges between groups continue with more material put into the network of exchanges.
1000 A.D. Upper Archaic Period Middle Horizon Intermediate Cultures	Growth of sociopolitical complexity; development of status distinctions based on wealth. Shell beads gain importance, possibly indicators of both exchange and status. Emergence of group-oriented religious organizations; possible origins of Kuksu religious system at end of period. Greater complexity of exchange systems; evidence of regular, sustained exchanges between groups; territorial boundaries not firmly established.
500 B.C. Middle Archaic Period Middle Horizon Intermediate Cultures	Climate more benign during this interval. Mortars and pestles and inferred acorn economy introduced. Hunting important. Diversification of economy; sedentism begins to develop, accompanied by population growth and expansion. Technological and environmental factors provide dominant themes. Changes in exchange or in social relations appear to have little impact.
3000 B.C. Lower Archaic Period Early Horizon Early San Francisco Bay Early Milling Stone Cultures	Ancient lakes dry up as a result of climatic changes; milling stones found in abundance; plant food emphasis, little hunting. Most artifacts manufactured of local materials; exchange similar to previous period. Little emphasis on wealth. Social unit remains the extended family.
6000 B.C. Upper Paleo-Indian Period San Dieguito Western Clovis 8000 B.C.	First demonstrated entry and spread of humans into California; lakeside sites with a probable but not clearly demonstrated hunting emphasis. No evidence for a developed milling technology, although cultures with such technology may exist in state at this time depth. Exchange probably ad hoc on one-to-one basis. Social unit (the extended family) not heavily dependent on exchange; resources acquired by changing habitat.

Moratto (1984) suggests the Early Horizon dated to ca. 4,500 to 3,500/3,000 years ago with the Middle Horizon dating to ca. 3,500 to 1,500 years ago and the Late Horizon dating to ca. 1,500 to 250 years ago. The Early Horizon is the most poorly known of the period with relatively few sites known or investigated. Early Horizon traits include hunting, fishing, use of milling stones to process plant foods, use of a throwing board and spear ("atlatl"), relative absence of culturally affected soils (midden) at occupation sites, and elaborate burials with numerous grave offerings.

Middle Horizon sites are more common and usually have deep stratified deposits that contain large quantities of ash, charcoal, fire-altered rocks, and fish, bird, and mammal bones. Significant numbers of mortars and pestles signal a shift to plant foods from reliance on hunted animal foods. Middle Horizon peoples generally buried their dead in a fetal position and only small numbers of graves contain artifacts (and these are most often utilitarian). Increased violence is suggested by the number of burials with projectile points embedded in the bones or with other marks of violence.

The Late Horizon emerged from the Middle Horizon with continued use of many early traits and the introduction of several new traits. Late Horizon sites are the most common and are noted for their greasy soils (midden) mixed with bone and fire-altered rocks. The use of the bow-and-arrow, fetal-position burials, deliberately damaged ("killed") grave offerings, and occasional cremation of the dead are the best known traits of this horizon.

Acorn and seed gathering dominated the subsistence pattern with short and long-distance trade carried out to secure various raw materials. Compared to earlier peoples, Late Horizon groups were short in stature with finer bone structure; evidence perhaps of the replacement of original Hokan speaking settlers by Penutian speaking groups by ca. 1,500 years ago.

Another scheme proposed by Chartkoff and Chartkoff (1984) is also used by archaeologists; its features are summarized in Table 8.3-2.

8.3.1.3 Ethnographic Background

The EAEC is located within the territory associated with the ethnographic and historic boundaries of the *Julpun* tribelet of the Bay Miwok and the *Jalalon*, *Nochochomne,* and *Asirin* tribelets of the Northern Valley Yokuts (Figure 8.3.2). Maps of ethnographic and historic tribal boundaries are provided by Bennyhoff (1977:Map 2), Kroeber (1925), Schenck (1926:137), Levy (1978a and b), and Wallace (1978b). For the most part, the EAEC project area appears to have been within Northern Valley Yokuts territory – a group that entered the San Joaquin drainage to displace Costanoans and/or Miwok groups (Wallace, 1978b:463).

Each Bay Miwok tribelet occupied a specific territory, using several more or less permanently inhabited settlements and a larger number of seasonal campsites at various times during their annual subsistence round (Levy, 1978a:398). The Northern Valley Yokuts relied on fishing and fowling and the harvesting of wild plant foods including tule roots (Wallace, 1978b:464). In historic times, the Yokuts trekked to Monterey Bay in Costanoan territory (Pilling, 1950 after Wallace, 1978b:465) and also traded with the Miwok and Costanoan (Davis, 1961:33 after Barrett and Gifford, 1933:270; Pilling, 1950:438).

TABLE 8.3-2
The Chartkoff and Chartkoff (1984) Model of Cultural Periods in California

Pre-Archaic Period - 11,500-9,000 B.C.

Pre-Archaic populations were small and their subsistence included big game hunting of now extinct mammoth and mastodon. Research indicates that the Pre-Archaic economies were based on a wide-ranging hunting and gathering strategy, dependent to a large extent on local lake-marsh or lacustrine habitats.

Early to Middle Archaic Period - 9,000-4,000 B.C.

During the Early and Middle Archaic periods, prehistoric cultures began to put less emphasis on large-game hunting. Subsistence economies probably diversified somewhat, and Archaic era people may have started using such ecological zones as the coast littoral more intensively than before. Advances in technology (milling stones) indicate that new food processing methods became important, enabling more efficient use of certain plant foods, including grains and plants with hard seeds.

Late Archaic Period - 4,000-2,000 B.C.

An important technological advance was the discovery of a tannin-removal process for the abundant and nutritious acorns. Prehistoric trade networks developed and diversified, bringing raw materials and finished goods from one region to another. Resource exploitation, as during the Early and Middle Archaic, was generally seasonal. Bands moved between established locations within a clearly defined/defended territory, scheduling resource harvests according to their availability. Clustering of food resources along the shores of large lakes or the banks of major fish-producing rivers allowed for larger seasonal population aggregates. Dispersed resources, such as large and small game, during the winter prompted small family groups to disperse across the landscape for more efficient food harvesting. The spear thrower (atlatl) may have been introduced or increased in importance, accounting for a change in projectile point styles from the Western Stemmed to the Pinto and Humboldt series. Seed grinding increased in importance.

Early and Middle Pacific Periods - 2,000 B.C.-A.D. 500

The Pacific Period is marked by the advent of acorn meal as the most important staple food. Increasing population densities made it desirable and necessary for Indian populations to produce more food from available land and to seek more dependable food supplies. The increasing use of seed grinding and acorn leaching allowed for the exploitation of more dependable food resources; increased use of previously neglected ecological zones (the middle and high Sierran elevations) may also have been part of this trend.

Late Pacific Period – A.D. 500-1400

Around A.D. 500 – 600, a cultural watershed was triggered by the introduction of the bow and arrow, which replaced the spear thrower and dart as the hunting tool/weapon of choice. The most useful time markers for this period tend to be small projectile points/arrow tips. Another trend is the marked shift from portable manos/metates to bedrock mortars/pestles (Moratto, 1984). Moratto, et al. (1978) demonstrated that this was a time of cultural stress, during which trading activity abated, warfare was common, and populations shifted away from the Sierra Nevada foothills to higher mountain elevations. They explain these changes in terms of rapid climatic fluctuations, including a drier climate and a corresponding shift of vegetation zones.

Final Pacific Period - A.D. 1400-1789

Populations became increasingly sedentary and depended more on staple foods, even as the diversity of foods exploited increased. Permanent settlements with high populations were more common. Every available ecological niche was exploited, at least on a seasonal basis. Other trends included the resurgence of long-distance trade networks and the development of more complex social and political systems.

Most of the main settlements occupied the top of low mounds, on or near the banks of large watercourses (Wallace, 1978b:466; Schenck, 1926:132; Schenck and Dawson, 1929:308; Cook, 1960:242, 259, 285). The village of Pescadero, located on the southwest side of Union Islands ("a mile or two northeast of Bethany"), is the closest known village in the project area (Wallace, 1978b:469).

The aboriginal lifeway apparently disappeared by 1810 due to its disruption by new diseases, a declining birth rate, the impact of the mission system, depredation by prospectors on their way to the gold country, and later displacement by Euroamerican farming. As with other Native California groups, the Bay Miwok and Yokuts were transformed from hunters and gatherers into agricultural laborers who lived at the missions and worked with former neighboring groups such as the Costanoan and Esselen (Levy, 1978b:460). Thus, multi-ethnic Indian communities grew up in and around former Yokuts and Bay Miwok territory. The Native Americans that resided in these communities provided much of the ethnological data, along with the detailed accounts by contact explorers, which form the basis of the descriptions of the ethnographic inhabitants of the San Francisco Bay area and central California (Garaventa, et al., 1991:14). A more thorough review of the Native American groups in the project area can be found in Kroeber (1925), Latta (1977), Levy (1978a), Wallace (1978a,b), Silverstein (1978), Theodoratus et al. (1980), and Moratto (1988, 1990).

8.3.1.4 Historical Background

The EAEC project area is located partly in western San Joaquin County, north and northwest of Tracy; and in the northeasternmost corner of Alameda County and the southeastern most corner of Contra Costa County. According to Minor (1994:1-2), the portion of San Joaquin County that lies south and west of the San Joaquin River was known as the "West Side" – an area slow to develop in the 19th century. As with most areas of the greater San Francisco Bay Area, the immediate project area's recorded history can be divided into three periods: the Spanish Period (1769-1822), the Mexican Period (1822-1848), and the American Period (1848-present).

Spanish Period. Spain claimed Alta California from 1542 when Cabrillo made his voyage. In the mid-1700s, the Spanish established defensive settlements along coastal Alta California to deter encroachment from Russian and British interests. An army garrison and Indian mission was established in San Diego in 1769 and another in Monterey in 1770. In 1772 Lieutenant Pedro Fages – the Commander of the Monterey Mission – was ordered to travel north from Monterey to San Francisco Bay to find a location for a new mission and presidio (Bancroft, 1884:183). This expedition was the first to explore lands in what is now Contra Costa County. An expedition traveled up the eastern bay shore to present-day Pinole where they turned east and followed the southern shore of Carquinez Straight and Suisun Bay – reaching what is now Antioch. From there, the expedition turned south through San Ramon and Amador valleys, passing the future site of Mission San Jose, and returned to Monterey (Bancroft, 1884:184-185; Smith and Elliot, 1879:7).

In March 1776, the Juan Bautista de Anza expedition followed Fage's path to Antioch and continued east to the plains of eastern Contra Costa County, then turned south toward Tracy and westward over the Coast Ranges back to Monterey (Bolton 1931:146-149).

In fall 1776, Father Palou and Jose Joaquin Moraga founded a garrison and mission in San Francisco (Milliken, 1986:28). Moraga led a party of Spaniards over Altamont Pass and explored the San Joaquin Valley for 16 days (Bolton, 1931:127-131).

Between 1778 and 1806, many San Francisco Bay Area Indians underwent missionization. While there is no record of Spanish troops penetrating east of Mount Diablo during this period, Spanish expeditions entered the Central Valley in 1806, 1808, 1810, and 1811, visiting Indian villages along the San Joaquin River and its tributaries. Most river-dwelling tribes of eastern Contra Costa County went to Mission San Jose between 1810 and 1812. The Bay Miwok were the first group in the project vicinity to be missionized, starting in 1794 and ending in 1827 (Levy, 1978:401). Both the Bay Miwoks and Yokuts were taken to a number of missions, including San Jose, Santa Clara, as well as missions further south at Soledad, San Juan Bautista, and San Antonio (Wallace, 1978b: 468 after Merriam, 1955:188-225; 1968:48, 77). From that time until 1836, eastern Contra Costa County appears to have been uninhabited (Milliken, 1986:28).

Spanish government policy was directed at the founding of presidios, missions, and secular towns with the land held by the Crown. In contrast, the later Mexican policy stressed individual ownership of the land (Findlay and Garaventa, 1983:24). In the project vicinity, Father Jose Viader with Gabriel Moraga made two visits in 1810 (Beck and Haase, 1974). On Union Island near Bethany they found the Yokuts village of Pescadero ("fisherman") and later Rancho El Pescadero (35,556 acres) received its name from this native settlement (Hoover, Rensch and Rensch, 1966). Governor Manuel Micheltorena granted this 8-square-league grant to Antonio M. Pico on November 28, 1843; the rancho was patented to Pico and Henry M. Naglee on March 10, 1865 (Hendry and Bowman, 1940:657 with Beck and Haase, 1974: #28, #30). This rancho name may have been after the *Rio del Pescadero*, a name used by Fernando de Rivera in December 1776, and believed to have been used in reference to the old channel of the San Joaquin River (Gudde, 1974:243). The majority of this rancho is situated within San Joaquin County (35,454 acres) but also included acreage in Alameda (76 acres) and Contra Costa counties (16 acres). A deposition of 1852 indicates that hostile Indians prevented Pico from occupying the rancho until 1848 (US/ND, v.d:5).

None of the known house locations were located in the very small portion of the rancho now within Alameda County. The rancho headquarters appears to have been located about midway down the west side of the rancho west of Old River and associated with a road proceeding from the northwest corner of the rancho southward past "*brazas*" (probably meanders of the river) (Bowman, n.d.; Hendry and Bowman, 1940:657 with Beck and Haase, 1974:#28, #30; US/ND, n.d.). No known historic structures dating to either the Spanish or Mexican periods are present in the EAEC project area.

Mexican Period. During the Mexican Period (1822 to 1846) and into the American Period, the project area was situated partially within Rancho El Pescadero). As explained by Bramlette, et al. (1991:0-10), the newly-created Mexican government had to deal with secularization of the missions. Of the 21 missions, 10 were released in 1834, five in 1835, and the remaining six in 1836 (Beck and Williams, 1972:79). While some resident Indians received land allotments, none retained their lands for more than a few years (Bean, 1978:53) with the result that most Indians served as laborers on the ranchos spreading throughout Mexican California.

Between 1834 and 1846, more than 800 land patents, comprising more than 12 million acres, were issued to individuals by the Mexican government (Lavender, 1976:30). Under the rancho system, land outside of towns was considered valuable only for grazing purposes. Any citizen of good character could get a grant for a grazing tract. The grantee was required to submit a *diseño* (description and map) of the area he desired. By 1845, most of the land holdings were in the form of large ranchos. Increasingly bad relations between the United States and Mexico led to the Mexican-American War of 1847, which resulted in Mexico releasing California to the United States under the Treaty of Guadalupe Hidalgo in 1848.

American Period. As explained by Fong et al. (1991:5-6), throughout the Spanish and Mexican Periods, land was abundant and settlers were few in number and land had minimal value. It was not until the American takeover of California in 1846 that land was coveted and valued. As early as March 13, 1847, the *California Star* published complaints about the good agricultural land claimed by a few *Californios* who held large ranchos. By the mid-19th century, most of the rancho and pueblo lands in California were subdivided as the result of population growth and the American takeover. California's rapid growth was attributed to the Gold Rush (1848), the completion of the transcontinental railroad (1869), and construction of local railroads. Later, the development of the refrigerator railroad car (ca. 1880s), which was used to transport local agricultural produce to distant markets, had a major impact on population growth (Guedon, 1978; Hart, 1978).

The EAEC project is partly located in the northeast corner of Alameda County, which was carved from parts of Santa Clara and Contra Costa counties in 1853 (Coy, 1973:91, 230; Hart, 1978:7, 93).

The Old, Middle, and San Joaquin rivers, as well as numerous sloughs and their attendant reclaimed islands and aqueducts, are the most prominent features in the study area (U.S. War Department, 1943; Byron). Early maps of the San Francisco Bay area illustrate marshy areas in the project vicinity and at times even label the prominent "Union Island" at the southern end of the area (Goddard, 1857; Elliott and Moore, 1881). Reclamation and agricultural land use patterns within the project area and surrounding areas intensified during the late 19th century. Reclaimed lands include Union Island (reclaimed 1880-1890); the Byron Tract, Coney Island, the Lower and Upper Jones Tract, the Palm/Orwood Tract, and Victoria Island (reclaimed 1900-1910); and McDonald and Bacon Islands (reclaimed 1910-1920) (see Chan, 1986:166, Map 7 after Thompson, 1957).

Early reclamation efforts from the 1850s through the 1880s relied on "wheelbarrow brigades" of Chinese laborers who were employed by both individual landowners and land-reclamation corporations. They built up the low natural levees surrounding most of the delta islands; the effort at Union Island involved about 1,000 Chinese laborers. The introduction of the clamshell dredge in 1879 replaced human laborers. A comprehensive review of the history of Chinese and Japanese contributions to the agricultural development of the delta is provided by Garaventa et al., (1991:19-20).

The delta rivers provided important transportation links; towns, villages, and landings were located in the project vicinity. In some cases, the landings were later replaced or supplemented by railroad transportation. One example is a shipping landing known as Burns Landing in the 1850s and later as Mohr's Landing until it was destroyed in the floods of

1862 and 1864. This former shipping landing was situated along the Old River in Rancho El Pescadero (Garaventa et al., 1991:21).

Byron (Byron Hot Springs), which is located northwest of the project area, was known to the local Native Americans and was used from 1849 onward by Euroamericans as a hot springs with healing qualities. The springs included 5 bathing and 15 drinking springs and 5 cottages with a capacity for 40 guests in its heyday (Munro-Fraser, 1882:497).

The earliest U.S. Geological Survey (USGS) maps available for the project vicinity illustrate the widely isolated and limited number of structures in the project area (USGS Bethany: 1914 – later Clifton Court Forebay; Brentwood:1914; Byron:1916; Holt:1913; Union Island:1914; and Woodward Island:1913). For the most part, these structures and pumping plants are confined to the periphery of the islands and are usually located along levees, roads, and railroad tracks. In addition to agriculturally focused towns and outliers, Mountain House was a notable 19th century settlement originally known as Zimmerman's (after the 1853 tavern owner)(Mosier and Mosier, 1986:59). Roads to and from Mountain House proceeded north to Martinez and beyond and to the south through the Altamont Pass into the Livermore Valley and points west. Later, Mountain House was still important with roads intersecting the railroad north with Mountain House Road and east with Grant Line Road (Higley, 1857; Mosier and Mosier, 1986:59).

The EAEC plant site lies within lands formerly owned by Charles McLaughlin (Thompson and West, 1878:54). McLaughlin was one of the largest landowners in Murray Township in 1878 where he was a contractor to the railroad companies. He received land from the railroads as payment for his services (Halley, 1876:492).

8.3.1.5 Resources Inventory

Inventory methods for the EAEC project area consisted of archival research, a pedestrian survey, architectural reconnaissance, and Native American consultation.

Archival Research. CH2M HILL conducted a record search at both the Northwest Information Center of the California Historical Resources Information System (CHRIS) at Sonoma State University in Rohnert Park (File No. 00-891) for Alameda and Contra Costa counties and the Central California Information Center of the CHRIS at Stanislaus State University in Turlock (File No. 3961 L) for San Joaquin County. The searches, which included the project APE and areas within 1 mile of the APE, determined that some portions of the project area APE have been surveyed previously for cultural resources.

The Northwest Information Center reported one archaeological site (CA-ALA-456) and one isolated find (ISO-12) to be located within the project vicinity. Twenty-eight (28) individual investigation reports have been filed in the CHRIS archives for the portion of the project area lying within Alameda and Contra Costa counties. The Central California Information Center reported 24 cultural resources in the project area and 26 investigation reports for the portion of the project area lying in San Joaquin County. No known/recorded cultural resources will be physically or indirectly affected by the proposed project facilities. Only a few cultural resources are located near any proposed facility or linear: CA-ALA-456; P-39-000145, -146, -147, -343, -345, -366, -370, -435, and -470. Each of these nearby cultural resources is described briefly below. No other city, county, state, and/or federal historically

or architecturally significant structures, landmarks, or points of interest are located in or adjacent to the project. An archaeological survey map is shown on Figure 8.3-3.

Archaeological Site CA-ALA-456. This site is a rockshelter (small cave) in a sandstone outcrop that exhibits a fire-blackened ceiling and is associated with at least four bedrock mortar holes. The site was subject to some preliminary site testing (see Holman et al., 1984b and Killam, 1987:21-23).

Cultural Resource P-39-000145 (CA-SJO-7). According to the archaeological site record form, CA-SJO-7 was first recorded by Gordon W. Hewes on May 31, 1939. The site is described as a burial mound in a now leveled field. Flexed (posture) burials and obsidian projectile points were observed when the field was leveled by a "Letourneau Scraper." Archaeological Sites CA-SJO-8 and CA-SJO-9 are located a short distance north of this site.

Cultural Resource P-39-000146 (CA-SJO-8). According to the archaeological site record form, CA-SJO-8 was first recorded by Gordon W. Hewes on May 31, 1939. The site is described being located in a now level field about 800 feet north of CA-SJO-7. Human burials were found when the field was leveled using a "Letourneau Scraper."

Cultural Resource P-39-000147 (CA-SJO-9). According to the archaeological site record form, CA-SJO-9 was first recorded by Gordon W. Hewes on May 31, 1939. The site is described as being located in a leveled field. Remains found included: "*Burial #1; two more skulls – gift of Mr. Currell, other lots of skeletal material recently scraped by Mr. Currell; mortar, metate, pestle fragments recovered from scrapings. From one such scraped out burial Mr. Currell secured ca. 100 square cut Olivella beads,* [the] *sample collected by U.C.* [University of California, Berkeley]; *also manos, pestles*."

Cultural Resource P-39-000343 (CA-SJO-229H). This is the location of the former town of Wicklund (ca. 1860-1870). The site record (CA-SJO-229H) notes that the site has been under cultivation for many years. Numerous agricultural ditches cross the site and no architectural remains are visible. The only physical indications of the presence of a site is a dispersed scatter of historic artifacts (broken glass, ceramic fragments, unidentified iron).

Cultural Resource P-39-000345 (CA-SJO-231H). According to the archaeological site record form, CA-SJO-231H is a moderately dense scatter of historic artifacts, consisting mainly of glass and ceramic fragments. The scatter appears to be associated with structures that appeared on a 1943 topographic map but were not present on a 1914 map. Presently, there are no buildings or foundations present; only an artifact scatter that is subject to annual plowing.

Cultural Resource P-39-000366. According to the Primary Record Form, P-39-000366 is a complex of historic farm structures including a single family home (abandoned), a barn, a two-story water tower, a garage, and a shed. The rectangular-shaped one-story single family home is a typical example of the hall-and-parlor, side-gabled National Folk Style. Hall-and-parlor houses were first executed with heavy timber framing in the Tidewater South and then with hewn log walls over the vast U.S. Midland region. After the expansion of the railroads, this form was executed with light framed walls and remained the dominant folk housing type over much of the rural Southeast until well into the 20th century.

Cultural Resource P-39-000370. According to the Primary Record Form, P-39-000370 is an isolated prehistoric Native American artifact (a silicate core - a piece of lithic raw material used to detach flakes) that was located in a plowed field.

Cultural Resource P-39-000435. According to the Primary Record Form, P-39-000435 is a scattering of highly fragmented pieces of glass and ceramics covering an area roughly 100 feet in diameter. Most of the artifacts post-date World War (WW) II but a few pieces pre-date WW I and may be late 19th century in age.

Cultural Resource P-39-000470. According to the Primary Record Form, P-39-000470 is a segment of the Westside Irrigation District's main drain canal, which was built between 1926 and 1928 to solve drainage problems caused by the creation of the Westside Irrigation District and neighboring Naglee Burk Irrigation District. The canal is still in use and is continuously maintained by cleaning and/or dredging. Some parts of the canal have been lined with "gunnite."

Reports provided by CHRIS offices examined for this project include Archeo-Tec (1989, 1990), Baker and Shoup (1991), Bramlette et al. (1990, 1991), Busby (1994), California Office of Historic Preservation (CAL/OHP) (2000a,b), CAL/OHP (1976), Canaday et al. (1992), City of Tracy (1978), Clark (1983), Contra Costa County (1989), Derr (1992), Fong et al. (1991), Foster (1996), Fredrickson (1975), Hatoff et al. (1995), Holman (1982, 1983a,b,c,d, 1984a,b,c, 1985, 1986), Jensen and Associates (1986), Jones and Stokes Associates (1988), Killam (1988), Minor (1994), Moratto (1990), Moratto et al. (1994), Owens (1991), Peak and Associates (1980, 1986, 1997, 1999), Price (1992), Reclamation (1983), Romano (1990), Seidel (1989), Shapiro and Syda (1997a,b), Slater and Holman (1982), True et al. (1981), West (1989, 1991, 1994), West and Scott (1990), Werner (1998), Windmiller (1999), Windmiller and Osanna (2000), and Wishman (1994).

Field Survey. Pedestrian field survey of all EAEC project elements was conducted on November 1 to 3, 2000, by Mr. Robin McClintock using 20-meter intervals between survey transects. Mr. McClintock holds a Bachelors' degree in anthropology and has more than 18 years of experience in cultural resource management and archaeological research. An additional survey of new linear alignments was conducted on February 9 by Mr. Robert Harmon. Mr. Harmon has a Masters Degree in Anthropology/Archaeology of California from California State University, Hayward, and over 20 years direct experience conducting archaeological surveys in the greater San Francisco Bay Area. A 150-foot-wide survey corridor (75 feet each side of the centerline) was employed. Variations in ground conditions (paved areas, vegetation cover, access restrictions, etc.) required some use of an opportunistic survey strategy. The entire project area is currently, or has in the past, been the subject of intense agricultural activity. As a result, extensive ground disturbance from cultivation, ditch construction, material laydown areas, utility construction and maintenance, and unpaved maintenance roads is prevalent across the project area. These areas typically provided the best opportunities to observe exposed soil surfaces. Elements subject to intensive field survey included the plant site location, electrical lines running between Kelso Road and Byron Bethany Road, gas- and waterlines running down Kelso Road, waterlines running down Bruns Road, a gasline running south from Kelso Road to the existing gas pipeline near Mountain House Creek, and the waterline running from the proposed Mountain House WWTP northwest of Tracy to Byron Bethany Road. Each of these

elements is treated individually by alternative in the section below and can be seen on Figure 8.3-3.

East Altamont Energy Center and Construction Laydown Area. The location of the proposed EAEC and laydown area is described in Section 2.0 of this application. The EAEC was surveyed in meandering, but generally parallel, transects at 20-meter intervals. Where not otherwise obscured, open grassy areas were carefully inspected. Although visibility was poor over some portions of this area, a significant portion of it had been largely de-vegetated from current and recent heavy agricultural use not associated with this project. No evidence of surface or subsurface archaeological deposits was observed in this area.

Electrical Transmission Lines. Alignments 1a and 1b parallel Mountain House Road between Byron Bethany Road and Kelso Road. The south half of the area west of Mountain House Road is covered in facilities associated with the existing Tracy substation. The area north of the substation is undeveloped but appears to have been graded in many areas and clearly has been subject to considerable disturbance. Visibility in this area, however, is good. The alignment east of Mountain House Road is a mix of fallow and agricultural fields. Some areas have been de-vegetated as mentioned above. No evidence of surface or subsurface archaeological deposits was observed in this area.

Natural Gas Supply Lines.

Alignment 2a (Preferred): Both sides of Kelso road were examined. The south side of the road is a mix of residential, undeveloped, and agricultural properties. The residential and undeveloped properties generally provided poor surface visibility due to landscaping, paved areas, and heavy vegetation. The agricultural property west of the canal and south of Kelso road had been recently plowed and provided near 100 percent surface visibility as did the partially landscaped grounds around the gas facility near the pipeline. In contrast, the north side of the road between the canal and the gas pipeline provided minimal surface visibility due to tall and heavy vegetation. No evidence of surface or subsurface archaeological deposits was observed along this alignment.

Alternative Gas Alignments 2c[1], 2d, 2e: Alternatives 2c, 2d, and 2e all cross private property south of Kelso Road. The area is primarily open pasture and open agricultural properties. The more southern portions of these alternatives were surveyed by others previously (Figure 8.3-3). Based on the record searches, there are no previously known sites in the intervening area that was not surveyed. Additional surveys of the sections not verified through field surveys would be completed prior to implementing an alternative alignment. Because Alternatives 2c, 2d, and 2e have wide flexibility in locating (within a corridor of 200 to 300 feet), it is believed that any unique cultural resources can be avoided if they are discovered prior to project implementation. As noted above, no evidence of surface or subsurface archaeological deposits was observed along the preferred alignment.

Domestic Water Supply Lines.

Alignment 3a: This alignment had been previously surveyed for a different project and was not re-examined.

[1] Alternative 2b was abandoned during early project scoping.

Alignment 3b: The route of this alignment, following the canal, courses through agricultural fields, fallow lands, and pasture. These areas provide variable surface visibility. Dirt access roads parallel the canal along its entire course and provide good surface visibility. Most of the area adjacent to the canal appears to have been highly disturbed, and the original ground surface is difficult to ascertain. The small hills that the canal wraps around appeared to carry a potentially higher probability of containing archaeological sites because they are the highest ground in the area. These low hills were intensively examined. No evidence of surface or subsurface archaeological deposits was observed along this alignment.

Alignment 3d[2]: The route of this alignment follows a gravel road through agricultural fields and vineyards east of Bruns Road to a point approximately 400 feet west of the Delta-Mendota Canal. From there it turns north to Byron Bethany Road, crosses the Delta-Mendota Canal in the road right-of-way, and then turns south on Mountain House Road to the site. These areas provide good surface visibility. The gravel access road is highly disturbed fill soil and would potentially obscure any cultural artifacts. No evidence of surface or subsurface archaeological deposits was observed along this alignment.

Alignment 3e (Preferred): The route of this alignment is very similar to 3d, but tunnels under the Delta-Mendota Canal, rather than going around it in the Byron Bethany Road ROW. The alternative follows the gravel road through agricultural fields and vineyards east of Bruns Road to a point approximately 200 feet west of the Delta-Mendota Canal. From there it would tunnel under the Delta-Mendota Canal, via trenchless methods, to emerge near the project site. These areas provide good surface visibility. The gravel access road is highly disturbed fill soil and would potentially obscure any cultural artifacts. No evidence of surface or subsurface archaeological deposits was observed along this alignment.

Recycled Water Supply Line.

Alignment 4a: All of this route has been previously surveyed by others and was not re-examined for this project. One site, P-39-000343, the site of the former townsite of Wicklund, appears to be just north and potentially adjacent to the Mountain House Waste Water Treatment Plant, a facility planned for the future community of Mountain House, but not part of this project. Therefore, the potential effects of that facility are not addressed here.

Alignment 4b (Preferred): All of this route has been previously surveyed by others and was not re-examined for this project. One site, P-39-000343, the site of the former townsite of Wicklund, appears to be just north and potentially adjacent to the Mountain House Waste Water Treatment Plant, a facility planned for the future community of Mountain House, but not part of this project. Therefore, the potential effects of that facility are not addressed here.

Architectural Reconnaissance. Homes, farmsteads, and commercial/industrial facilities older than 45 years are potentially significant historic resources in the project area. The project team did not observe any potentially significant historic buildings or structures within the proposed EAEC plant site, domestic waterline, electrical transmission, or gasline.

Native American Consultation. CH2M HILL contacted the NAHC by letter on October 26, 2000, requesting information about traditional cultural properties such as cemeteries and sacred places in the project area (see Confidential Appendix 8.3A). The NAHC responded

[2] Alternative 3c was abandoned during early project scoping.

on November 1 with the name of Katherine Erolinda Perez – an individual of Ohlone-Costanoan and Northern Valley Yokut and Bay Miwok heritage. Ms. Perez was contacted by letter on November 7, 2000. A summary of the results of consultations with Ms. Perez will be included in a future filing.

The NAHC record search of the Sacred Lands file failed to indicate the presence of Native American cultural resources in the immediate project area. The record search conducted at the Northwest Information Center and the Central California Information Center of CHRIS also failed to indicate the presence of Native American traditional cultural properties.

8.3.2 Environmental Impacts

No historic or archaeological sites were recorded or otherwise discovered in the investigation of the project plant site and the various facility alignment alternatives. Although no sites were discovered, it is possible that presently undetected archaeological sites could be affected by the proposed project.

8.3.2.1 East Altamont Energy Center and Construction Laydown Area

The field survey of the proposed plant site and laydown area resulted in negative findings. No prehistoric or historic archaeological remains were detected from surface examination of exposed soils. No historically or architecturally significant buildings or structures are present. Although no surface evidence for prehistoric archaeological sites could be detected, the proposed plant site is located in an area potentially sensitive for archaeological remains. Its geomorphologic setting is conducive for burying archaeological sites beneath alluvial deposited overburden (silts and other sediments left from episodic flooding of the Union Island area in prehistoric times). The possibility that buried archaeological sites could be disturbed or destroyed by construction cannot be ruled out unless the proposed plant site is subject to subsurface exploratory testing to check for the presence/absence of prehistoric archaeological remains.

8.3.2.2 Natural Gas Supply Lines

The field survey of the proposed natural gas supply lines resulted in negative findings, however, as explained above, the possibility that buried archaeological sites could be disturbed or destroyed by construction cannot be ruled out.

8.3.2.3 Electric Transmission Lines

The field survey of the proposed electrical transmission lines resulted in negative findings; however, as explained above, the possibility that buried archaeological sites could be disturbed or destroyed by construction cannot be ruled out.

8.3.2.4 Domestic Waterlines

The field survey of the domestic water supply lines resulted in negative findings; however, as explained above, the possibility that buried archaeological sites could be disturbed or destroyed by construction cannot be ruled out.

8.3.3 Cumulative Effects

Because the project would not affect known significant cultural resources, it would not be likely to cause significant cumulative impacts. If construction of the EAEC plant and/or any of its associated linear features (e.g., the natural gas supply line, the electrical transmission line or water supply) were to encounter a large, stratified, buried prehistoric archaeological site, the possibility of cumulative impacts would arise because such sites are highly significant, and many have been destroyed or damaged by agricultural activity and/or commercial/industrial/residential development in the project area. Given the relative low level of impact to such a site that these linear features would cause, it is also possible that proposed activities would not lead to significant cumulative impacts, depending on the extent of project impact to any such discovered archaeological deposits. Any potential impact to an unknown site would be minimized by monitoring during construction (Section 8.3.4) and by stop-work procedures if a site were uncovered.

8.3.4 Mitigation Measures

The best mitigation measure is to **avoid impact** to cultural resources that may be located in the project area. Avoidance can be accomplished by having the archaeologist and project engineer demarcate cultural resource site boundaries on the ground to ensure that proposed project improvements do not impinge on the resource(s). Where a tower, road, or pipeline must be placed within 100 feet of a known archaeological site, the site can be temporarily fenced or otherwise marked on the ground as an Environmentally Sensitive Area (ESA). Construction equipment can then be directed away from the ESA, and construction personnel directed to avoid entering the ESA. In some cases, additional archaeological work will be needed to better delineate ESA boundaries.

Prior to starting construction near a designated ESA, the construction crew should be informed of the resource values involved and of the regulatory protections afforded to the resources. The crew can also be informed of procedures relating to designated ESAs and cautioned not to drive into these areas to park or operate construction equipment on them. The crew can be cautioned not to collect artifacts and asked to inform their supervisor, should cultural remains be uncovered.

Though archaeological and historical sites were not found during project field survey of the proposed project elements, it is possible that subsurface construction could encounter buried archaeological remains. Since prehistoric archaeological sites and isolated artifacts have been found in the general vicinity, construction monitoring is recommended.

8.3.4.1 Monitoring During Construction

If recycled water route 4a is constructed, full-time archaeological monitoring should be conducted for the portion of the alignment north of Byron Bethany Road. This is recommended due to the relatively near location of P-39-000343, the site of the former town of Wicklund. All other project areas should be monitored on either a full-time or part-time

basis, to be determined at the discretion of the assigned Project Archaeologist (PA). The Project Archaeologist or his/her designated Archaeological Monitor (AM) should conduct the recommended construction monitoring. A PA and AM can be the same person, if properly qualified. Proper qualifications for a PA are the minimum qualifications for Principal Investigator on federal projects under the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation*. The AM should have 5 years of experience in conducting archaeological field projects or hold a Bachelor of Arts degree in anthropology, with an emphasis in archaeology, and have at least 1 year of experience in conducting archaeological field projects. The AM should be qualified to detect archaeological deposits in the field. In addition to site detection, the PA should be qualified to evaluate the significance of the deposits, consult with regulatory agencies, and plan site evaluation and mitigation activities.

To ensure participation by interested members of the local Native American community, it is recommended that a Native American monitor be present during any needed archaeological site testing and/or data recovery operations triggered as a consequence of archaeological remains being discovered during construction. Selection of the monitor should be made through the NAHC, and the Native American monitor could be retained either directly by the project applicant or through the subconsultant conducting the actual archaeological fieldwork.

A six-point archaeological monitoring program should be implemented as follows:

1. **Preconstruction Assessment and Construction Training**—The PA and AM will visit the project area before construction begins to become familiar with site conditions. As construction begins, the PA will conduct a worker education session for construction supervisory personnel to explain the importance of, and legal basis for, the protection of significant archaeological resources. This worker education session can take place at the same time as the paleontological training session (see Section 8.16.4) because both disciplines will involve the monitoring of excavation activities (although in different areas). Information about archaeological resources may be combined with information about cultural resources in the training brochure that will be distributed to construction supervisory personnel.

2. **Construction Monitoring**—The AM should be present at the construction site at all times when excavation is taking place within the zone of archaeological sensitivity. The AM's role will be to watch for buried archaeological deposits during excavation for roads, natural gas and water pipelines, and during the placement of underground electrical transmission cable or at-grade construction of electrical transmission poles.

   If the AM identifies archaeological remains during construction, the AM should immediately notify the PA and Site Superintendent, who should halt construction in the immediate vicinity of the find, as necessary. The Superintendent and AM will use flagging tape, rope, or other means to delineate the area of the find within which construction will halt. This area should include the excavation trench from which the archaeological finds came and any piles of dirt or rock spoil from that area. Construction should not take place within the delineated find area until the PA, in consultation with CEC staff, can inspect and evaluate the find. Appendix 8.3B provides a prototype plan to

deal with unexpected discoveries during construction. Figure 8.3-5 shows a flow chart of the steps of the construction program burial plan.

3. **Site Recording and Evaluation**—The PA and/or AM should follow accepted professional standards in recording any find and should submit the standard Department of Parks and Recreation (DPR) Primary Record forms (Form DPR 523) and location information to the appropriate CHRIS office (e.g., the Northwest Information Center or the Central California Information Center).

   If the PA determines that the find is insignificant, construction will proceed. If the PA determines that further information is needed to evaluate significance, the CEC and State Historic Preservation Officer (SHPO) will be notified, and the consultant will prepare a plan and a timetable for evaluating the find, in consultation with the CEC and SHPO.

   Under CEQA, a find would be considered significant (would be classified as an "important archaeological resource") if it:

- Is associated with an event or person of:
  - Recognized significance in California or American history, or
  - Recognized scientific importance in prehistory, or
- Can provide information that is both of demonstrable public interest and useful in addressing scientifically consequential and reasonable or archaeological research questions; or
- Has a special or particular quality such as oldest, best example, largest, or last surviving example of its kind; or
- Is at least 100 years old and possesses substantial stratigraphic integrity; or
- Involves important research questions that historical research has shown can be answered only with archaeological methods.

   Under the NHPA, a find is significant if it meets the NRHP listing criteria at 36 CFR 60.4:

- The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:
  - that are associated with events that have made a significant contribution to the broad patterns of our history, or
  - that are associated with the lives of persons significant in our past, or
  - that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or

– that have yielded, or may be likely to yield, information important in prehistory or history.

If human remains are found during construction, project officials are required by the California Health and Safety Code (Section 7050.5) to contact the appropriate County Coroner. Appendix 8.3B provides a prototype plan to handle inadvertent discoveries of burials. If the Coroner determines that the find is Native American, he/she must contact the NAHC. The NAHC, as required by the Public Resources Code (Section 5097.98) determines and notifies the Most Likely Descendant (MLD), and requests the MLD to inspect the burial and make recommendations for treatment or disposal.

If human remains are encountered on federally owned/administered land, the applicable federal agency would be required to negotiate under the Native American Graves Protection and Repatriation Act (NAGPRA) the repatriation of the remains to a lineal descendant or a culturally affiliated organization.

4. **Mitigation Planning** – If the PA and the consulting parties determine that the find is significant, they should prepare and carry out a mitigation plan in accordance with state and federal guidelines. This plan should emphasize the avoidance, if possible, of significant archaeological resources. If avoidance is not possible, the recovery of a sample of the deposit from which the archaeologist can define scientific data to address archaeological research questions should be considered an effective mitigation measure for damage to or destruction of the deposit.

   The mitigation program, if necessary, should be carried out as soon as possible to avoid construction delays. Construction should resume at the site as soon as the field data collection phase of any data recovery effort is completed. The PA will verify the completion of field data collection by letter to the Applicant and the CEC so that the Applicant can resume construction.

5. **Curation —** The PA will arrange for the curation of archaeological materials collected during the monitoring and mitigation program at a qualified curation facility. A qualified curation facility is a recognized, non-profit, archaeological repository with a permanent Curator. The PA shall submit field notes, stratigraphic drawings, and other materials developed as part of the archaeological excavation program to the curation facility along with the collection.

6. **Report of Findings** – If buried archaeological deposits are found during construction, the PA will prepare a report summarizing the monitoring and archaeological investigation program implemented to evaluate the find or to recover data from an archaeological site as a mitigation measure. This report should describe the site soils and stratigraphy, describe and analyze artifacts and other materials recovered, and explain the site's significance. This report should be submitted to the curation facility with the collection.

   Following these mitigation measures would lower any potential project effects on archaeological resources below the threshold of significance. Though it is possible that the project would encounter significant archaeological deposits, the monitor would be present to detect, evaluate, and recover them. The monitoring and mitigation program would, therefore, be effective.

Emergency maintenance and repair could cause impacts to cultural resources. This must be taken into consideration when developing specific mitigative measures to address impacts for any site that cannot be avoided during construction. The potential for ongoing impacts to any resource that cannot be avoided through project redesign must be considered. Any mitigative data recovery should be properly scoped, in conjunction with the appropriate agencies, to address potential long-term ongoing impacts.

8.3.5 LORS Compliance

Cultural resources that might be present in the EAEC project area could include some or all of the following types of resources:

- **Historic Properties.** Historic properties are places eligible for inclusion in the NRHP. Historic properties eligible for inclusion in the NRHP can include districts, sites, buildings, structures, objects, and landscapes significant in American history, prehistory, architecture, archaeology, engineering, and culture. Historic properties include so-called "traditional cultural properties." Historic properties must be given consideration under NEPA and the NHPA.
- **Native American Cultural Items**. Native American cultural items may include human remains (skeletal remains), funerary items, sacred items, and cultural patrimony. Native American cultural items must be given consideration under NEPA, NHPA, NAGPRA, and the American Indian Religious Freedom Act (AIRFA).
- **Archaeological Sites**. Archaeological sites and other scientific data must be given consideration under NEPA, the Archaeological Resources Protection Act (ARPA), the Archaeological Data Protection Act (ADPA), and to some extent under NHPA and NAGPRA.
- **Native American Sacred Sites**. Native American sacred sites must be considered under AIRFA and Executive Order 13007.
- **Other Cultural Resources**. Cultural institutions, lifeways, culturally valued viewsheds, places of cultural association, and other valued places and social institutions must be considered under NEPA, Executive Order 12898, and sometimes other authorities.

Applicable federal, state, and local laws, ordinances, regulations, and standards of significance are described below.

8.3.5.1 Federal LORS

Archaeological and architectural resources (buildings and structures) are protected through the NHPA of 1966 (16 USC 470f) and its implementing regulation, Protection of Historic Properties (36 CFR Part 800), the Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act of 1979.

Section 106 of NHPA requires federal agencies (Bureau of Indian Affairs [BIA], Bureau of Land Management [BLM]), U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, etc.), prior to implementing an "undertaking" (e.g., issuing a federal permit), to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) and the SHPO a reasonable opportunity to comment on any

undertaking that would adversely affect properties eligible for listing on the NRHP. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a tribe to be determined eligible for inclusion in the NRHP.

Under the NHPA, a find is significant if it meets the NRHP listing criteria at 36 CFR 60.4:

- The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:
  - that are associated with events that have made a significant contribution to the broad patterns of our history, or
  - that are associated with the lives of persons significant in our past, or
  - that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
  - that have yielded, or may be likely to yield, information important in prehistory or history.

Cultural institutions, lifeways, culturally valued viewsheds, places of cultural association, and other valued places and social institutions must also be considered under NEPA, Executive Order 12898 and sometimes other authorities.

The AIRFA of 1978 allows access to sites of religious importance to Native Americans. On federal land, ARPA and NAGPRA would apply. ARPA assigns penalties for vandalism and the unauthorized collection of archaeological resources on federal land and provides for federal agencies to issue permits for scientific excavation by qualified archaeologists. NAGPRA assigns ownership of Native American graves found on federal land to their direct descendants or to a culturally affiliated tribe or organization and provides for repatriation of human remains and funerary items to identified Native American descendants.

If a Federal permit of any kind is needed (such as a Clean Water Act [CWA] Section 404 permit from the U.S. Army Corps of Engineers), the NHPA and its implementing regulations (16 USC 470 et seq., 36 CFR 800, 36 CFR 60, and 36 CFR 63) will apply. The NHPA establishes the federal government's policy on historic preservation and the programs, including the NRHP, through which that policy is implemented. Under the NHPA, historic properties include "*any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places*" (16 USC 470w (5).

8.3.5.2 State LORS

CEQA review requires a determination if a project will have a significant effect on archaeological sites or a property of historic or cultural significance to a community or ethnic group. A historical resource for purposes of CEQA compliance is defined as a resource listed in, or determined eligible for listing in, the CRHR. The CRHR lists properties

that are to be protected from substantial adverse change and includes properties that are listed or have been formally determined to be eligible for listing in the NRHP, State Historic Landmarks, and eligible Points of Historical Interest (CAL/OHP, 1997).

Historical Resources – CEQA. CEQA applies to discretionary projects and equates a substantial adverse change in the significance of a historical resource with a significant effect on the environment (Section 21084.1) and defines substantial adverse change as demolition, destruction, relocation, or alteration that would impair historical significance (Section 5020.1). Section 21084.1 stipulates that any resource listed in, or eligible for listing in, the CRHR is presumed to be historically or culturally significant.

Resources listed in a local historic register or deemed significant in a historical resource survey (as provided under Section 5024.1g) are presumed historically or culturally significant unless the preponderance of evidence demonstrates they are not. A resource that is not listed in, or determined to be eligible for listing in, the CRHR, not included in a local register of historic resources, or not deemed significant in a historical resource survey may nonetheless be historically significant (Section 21084.1). Public Resources Code Section 21098.1 stipulates:

> A project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. For the purposes of this section, an historical resource is a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources. Historical resources included in a local register of historical resources, as defined in subsection (k) of Section 5020.1 [see below], are presumed to be historically or culturally significant for purposes of this section, unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant. The fact that a resource is not listed in, or determined to be eligible for listing in, the California Register of Historical Resources, not included in a local register or historical resources, or not deemed significant pursuant to criteria set forth in subdivision (g) of Section 5024.1 [see below] shall not preclude a lead agency from determining whether the resource may be an historical resource for purposes of this section.

Public Resources Code Sections 5020.1 and 5024.1 provide the following definitions:

- **Historic district** means a definable unified geographic entity that possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.
- **Historical landmark** means any historical resource that is registered as a state historical landmark pursuant to Section 5021.
- **Historical resource** includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic agricultural, educational, social, political, military, or cultural annals of California.

- **Local register of historic resources** means a list of properties officially designated or recognized as historically significant by a local government pursuant to a local ordinance or resolution.
- **Substantial adverse change** means demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired.

Archaeological Resources – CEQA. New guidelines became effective January 1, 1999 (see below). Where a project may adversely affect a unique archaeological resource, Section 21083.2 requires the Lead Agency to treat that effect as a significant environmental effect and prepare an Environmental Impact Report (EIR). When an archaeological resource is listed in or eligible to be listed in the CRHR, Section 21084.1 requires that any substantial adverse effect to that resource be considered a significant environmental effect. Sections 21083.2 and 21084.1 operate independently to ensure that potential effects on archaeological resources are considered as part of a project's environmental analysis. Either of these benchmarks may indicate that a proposal may have a potential adverse effect on archaeological resources.

Public Resources Code 21083.2 (g) defines unique archaeological resource to be:

An archaeological artifact, object, or site, about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information,
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type, or
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Formerly, Appendix K of the CEQA Guidelines (dropped from the new guidelines that took effect on January 1, 1999) took a broader approach, using the term "important" in place of "unique." Appendix K went beyond Section 21083.2 suggesting additional criteria to guide the Lead Agency in making a determination of uniqueness (the resource must be at least 100 years old and possess "substantial stratigraphic integrity" and the resource involves "important" research questions that historical research has shown can be answered only with archaeological methods). Now, Section 21084.1 requires treatment of any substantial adverse change in the significance of a historical resource listed in or eligible to be listed in the CRHR as a significant effect on the environment. The definition of "historical resource" includes archaeological resources listed in or formally determined eligible for listing in the CRHR and by reference, the NRHP, California Historical Landmarks, Points of Historical Interest, and local registers (see Sections 5020.1 and 5024.1).

Appendix K guided evaluation of impacts to prehistoric and historic archaeological resources. On October 26, 1998, Appendix K was deleted but its still-relevant guidance was moved into the body of CEQA in new Sections 15064.5 and 15126.4. To resolve conflicts between the narrow and limiting statutory provision for mitigation of archaeological resources and the broadly protective statutory provision for determining the significance of

historical resources, Section 15064.5(c) provides that to the extent an archaeological resource is also an historical resource, the provisions regarding historical resources apply. These new provisions endorse the first set of standardized mitigation measures for historic resources by providing that projects following the Secretary of the Interior's Standards for Treatment of Historic Properties shall be considered as mitigated to a less than significant level.

Other provisions put lead agencies on notice that, in many circumstances, the very popular method of mitigating impacts on historical resources by way of documentation (e.g., narrative, photographs, architectural drawings) will not mitigate the effects to a point where clearly no significant effect on the environment would occur. In Section 15331, a new categorical exemption is added for projects limited to restoration or rehabilitation of historic resources consistent with the Secretary of the Interior's Standards (Gorsen, 1999).

Native American Burials – Other California Laws and Regulations. Other state-level requirements for cultural resources management are written into the California Public Resources Code Chapter 1.7, Section 5097.5 (Archaeological, Paleontological, and Historical Sites), and Chapter 1.75, beginning at Section 5097.9 (Native American Historical, Cultural, and Sacred Sites) for lands owned by the state or a state agency.

The disposition of Native American burials is governed by Section 7050.5 of the California Health and Safety Code and Sections 5097.94 and 5097.98, of the Public Resources Code and fall within the jurisdiction of the NAHC. If human remains are discovered, the Alameda (or Contra Costa or San Joaquin) County Coroner must be notified within 48 hours and there should be no further disturbance to the site where the remains were found. If the remains are determined by the coroner to be Native American, the Coroner is responsible for contacting the NAHC within 24 hours. The NAHC, pursuant to Section 5097.98, will immediately notify those persons it believes to be most likely descended from the deceased Native American so they can inspect the burial site and make recommendations for treatment or disposal. Table 8.3-3 summarizes LORS applicable to cultural resources.

8.3.5.3 Local Laws and Regulations

Programs of cultural and historic preservation exist at the County level, and are linked with those of cities and with state and federal preservation programs. The San Joaquin, Contra Costa, and East Alameda counties have comprehensive local plans and ordinances in place to preserve significant cultural and historical resources. These ordinances and guidelines provide adequate safeguards for cultural and historic resources. The counties require development to be designed to avoid resources or, if avoiding these resources is infeasible, implementation of appropriate mitigation measures that offset the impacts to these resources. The counties will follow current CEQA guidelines for cultural and historic resource preservation procedures in reviewing development projects located near identified cultural and historic resources.

TABLE 8.3-3
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Cultural Resources

Law, Ordinance, Regulation, or Standard	Applicability	Project Conformity (?)	AFC Conformance Section
CEQA Guidelines	Project construction may encounter archaeological resources.	Yes	Section 8.3.4
Health and Safety Code Section 7050.5	Construction may encounter Native American graves, Coroner calls NAHC.	Yes	Section 8.3.4
Public Resources Code Section 5097.98	Construction may encounter Native American graves, NAHC assigns Most Likely Descendant.	Yes	Section 8.3.4
Public Resources Code Section 5097.5/5097.9	Would apply only if some project land were acquired by the state (currently no state land).	Yes	Section 8.3.4
National Historic Preservation Act	Issuance of a Clean Water Act Section 404 permit is a federal undertaking.	Yes	Section 8.3.4
Archaeological Resources Protection Act	Protects archaeological resources from vandalism and unauthorized collecting on federal land.	Yes	Section 8.3.5
Native American Graves Protection and Repatriation Act	Assigns ownership of Native American graves on federal land to Native American descendants or culturally affiliated organizations.	Yes	Section 8.3.5
San Joaquin 2010 General Plan	Sets goals to protect valuable architectural, historical, archaeological and cultural resources.	Yes	Section 8.3.5.3
Contra Costa 1995-2010 General Plan	Sets goals to identify and preserve important archaeological and historic resources within the County.	Yes	Section 8.3.5.3
East Alameda General Plan	Sets goals to protect cultural resources from development.	Yes	Section 8.3.5.3
Local plans	Sets goal	Yes	Section 8.3.5.4

San Joaquin County. The San Joaquin County General Plan (2010) includes the goal to protect San Joaquin County's valuable architectural, historical, archaeological, and cultural resources (San Joaquin County, 1992). San Joaquin's historic, archaeological, and cultural resource policies urge:

- Preservation of historical and cultural heritage through public and private efforts.
- Identification and protection of significant archaeological, and historical resources from destruction. If evidence of such resources appears after development begins, an assessment shall be made of the appropriate actions to preserve or remove the resources.
- No significant architectural, historical, archaeological or cultural resources shall be knowingly destroyed through County action.
- Reuse of architecturally interesting or historical buildings.
- Promotion of public awareness of and support for historic preservation.

Implementation of Cultural Resources Policies. San Joaquin's historic, archaeological and cultural resource policies will be implemented by:

Heritage Information Program. The County shall establish an educational program to be administered through the County Museum to acquaint the County's population with its landmark programs and preservation issues. (County Museum)

Promotion of Historic Preservation.

- The County shall continue to support and fund historical preservation efforts, such as the County Museum complex at Micke Grove, Harmony Grove Church, and Haggin Museum. (County Museum, Parks & Recreation)

- A Historic Preservation Commission shall be established to promote heritage preservation programs. (County Museum)

Historic Resource Inventory. The County shall inventory heritage resources in the unincorporated area and shall encourage inventories in the cities. (County Museum)

Historic Preservation Regulation. The County Development Title shall include archaeologic and historic preservation regulations that will specify procedures to be followed in the event that significant resources are discovered during the development process. (Planning)

Registration of Historic Properties. Owners of eligible historic properties shall be encouraged to apply for state and federal registration and to participate in tax incentive programs for historic restoration. (County Museum)

Contra Costa County. The Contra Costa County General Plan (1995-2010) includes the goal to identify and preserve important archaeologic and historic resources within the County (Contra Costa County, 1996). Contra Costa's historic, archaeological, and cultural resource policies urge:

- Preservation of areas that have identifiable and important archaeologic or historic significance, preferably in public ownership.

- Protection of buildings or structures that have visual merit and historic value.

- Development of surrounding areas of historic significance shall have compatible and high quality design in order to protect and enhance the historic quality of the area.

- Within the Southeast County area, applicants for subdivision or for land use permits to allow non-residential uses shall provide information to the County on the nature and extent of the archeological resources that exist in the area. The County Planning Agency shall be responsible for determining the balance between the multiple use of the land with the protection of resources.

Implementation of Cultural Resources Policies. Contra Costa's historic, archaeological and cultural resource policies will be implemented by:

Development Review Process.

- Develop an archaeological sensitivity map to be used by staff in the environmental review process for discretionary permits to determine potential impact upon cultural resources.

- As a condition of approval of discretionary permits, include a procedure to be followed in the event that archaeological resources are encountered during development or construction.

Ordinance Revisions.

- Review existing County ordinances and guidelines and make amendments as necessary to ensure that they provide adequate safeguards for archaeologic and historic resources.
- Develop design guidelines for areas adjacent to or within scenic corridors or historic sites.

Other Programs.

- Promote the use of the State of California Historic Building Code to protect historic sites in the County.
- Encourage owners of eligible historic properties to apply for state and federal registration of these sites and to participate in tax incentive programs for historic restoration.
- Seek coordination and cooperation with federal, state, and local governments, and with private and non-profit organizations, to establish funding sources to preserve, restore, and enhance unique historic sites. Such funding sources may be used to acquire and preserve sites or to acquire easements over sites and building facades.
- Identify funding mechanisms, including funding from the County to the extent possible, to support programs to preserve, restore, and enhance unique historic sites.

East Alameda. The East Alameda County General Plan includes the goal to protect cultural resources from development (East Alameda County, 1994). East Alameda's, historic, archaeological, and cultural resource policies urge:

- Preservation and identification of significant archaeological and historical resources, including structures and sites which contribute to the heritage of East County.
- Development to be designed to avoid cultural resources.

East Alameda has implemented a program to carry out the policies associated with protecting historic, archaeological, and cultural resources. The County shall require background and records check of a project area if a project is located within an extreme or high archaeological sensitivity zone as determined by the County. If there is evidence of an archaeological site within a proposed project area, an archaeological survey by qualified professionals shall be required as a part of the environmental assessment process. If any archaeological sites are found during construction, all work in the immediate vicinity shall be suspended pending site investigation by a qualified archaeology professional. Proposed structures or roads on property that contains archaeological sites should be sited in consultation with a professional archaeologist to avoid damaging the archaeological sites. Appropriate measures for preserving a historic structure include renovation or relocation. Proposals to remove historic structures shall be reviewed by qualified professionals.

8.3.6 Involved Agencies and Agency Contacts

Table 8.3-4 lists the state agencies involved in cultural resources management for the project and a contact person at each agency. These agencies include the California NAHC and, for federal lands, the CAL/OHP.

TABLE 8.3-4
Agency Contacts for EAEC Cultural Resources

Issue	Contact	Title	Telephone
Native American traditional cultural properties	Ms. Debbie Pilas-Treadway NAHC	Associate Government Program Analyst	(916) 653-4038
Federal agency NHPA Section 106 compliance	Mr. Daniel Abeyta California Office of Historic Preservation	(Acting) SHPO	(916) 653-6624

8.3.7 Permits Required and Permit Schedule

In addition to the CEC site certification, the EAEC project may require federal, state, or local permits that include provisions protecting cultural resources. If a previously undiscovered archaeological site is found during construction on state land the newly discovered site would require NRHP eligibility evaluation. If a CWA Section 404 permit is required for construction (wetland fills or crossings), consultation with the SHPO (under Section 106 of the NHPA) would be required (even though no federal land is involved in the project because federal permitting or licensing requires ACOE to consider whether the project would affect historic properties listed on or meeting the criteria for listing in the NRHP). Similarly, use of state or public lands or acquisition of discretionary development permits are subject to CEQA. Consultation with the SHPO and/or the state or local lead agency(s) is required if the project would affect historic properties listed on or meeting the criteria for listing in the CRHR.

If the project becomes subject to federal involvement, some or all of the following Section 106 compliance procedures would be followed as appropriate:

1. If the federal agency finds no historic properties that the undertaking might affect, the agency informs the SHPO, documents the finding, and proceeds with the undertaking.

2. If the agency finds historic properties and determines that the project would not affect them, then the agency informs the SHPO and documents the finding. The SHPO has 15 days in which to object to the finding, after which the agency may proceed with the undertaking.

3. If the agency finds historic properties that the project would affect, the agency and SHPO consult to determine whether the effect would be adverse. If the agency and SHPO find that the effect would not be adverse, the agency informs the ACHP, documents the finding, and the ACHP has 30 days in which to object to the finding. If there is no objection, the agency proceeds with the undertaking.

4. If the agency finds historic properties and determines that the project effects would be adverse, the agency and SHPO consult to determine how to mitigate these effects. This consultation culminates in a Memorandum of Agreement (MOA) between the agency, SHPO, and ACHP. The ACHP and SHPO are allotted 30 days in which to review and comment on a draft MOA. If the parties agree, the agency proceeds with the undertaking after signing and executing the MOA. If the agency does not agree to prepare an MOA, the ACHP must provide its comments on the undertaking within 60 days.

The Section 106 regulatory compliance process thus takes a minimum of 15 days if historic properties are found. This process can take from 60 to 90 days or more, depending on the complexity of the issues involved, the necessity of preparing a MOA, and other factors.

If Native American burials were discovered on federally owned land, the NAGPRA would require that the federal land management agency halt construction in the immediate vicinity of the find and contact a lineal descendant of the buried person or culturally affiliated organization. The regulations implementing NAGPRA (43 CFR 10) require that the federal agency notify the appropriate Native American persons or organizations within 3 days of the find. These regulations also require that construction activity in the immediate vicinity of the find stop for 30 days or until a written agreement is executed to adopt a recovery plan for the treatment or removal of the human remains.

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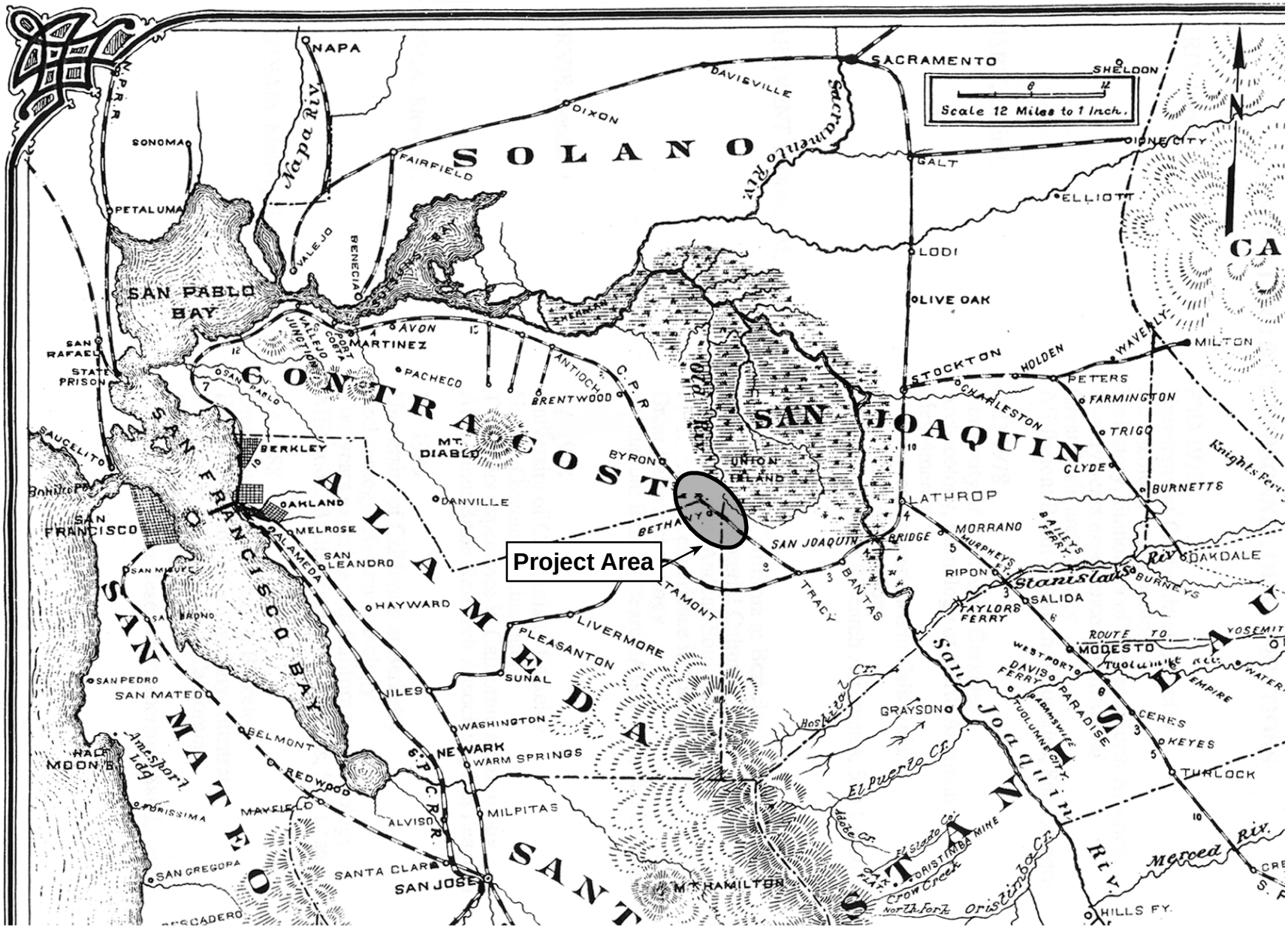

FIGURE 8.3-1

PROJECT AREA DURING THE LATE AMERICAN PERIOD, ABOUT 1881

(Elliot & Moore 1881)

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

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SAC-E 161327.LS.05.GR Figure 8.3-1 11-17-00 tiffany

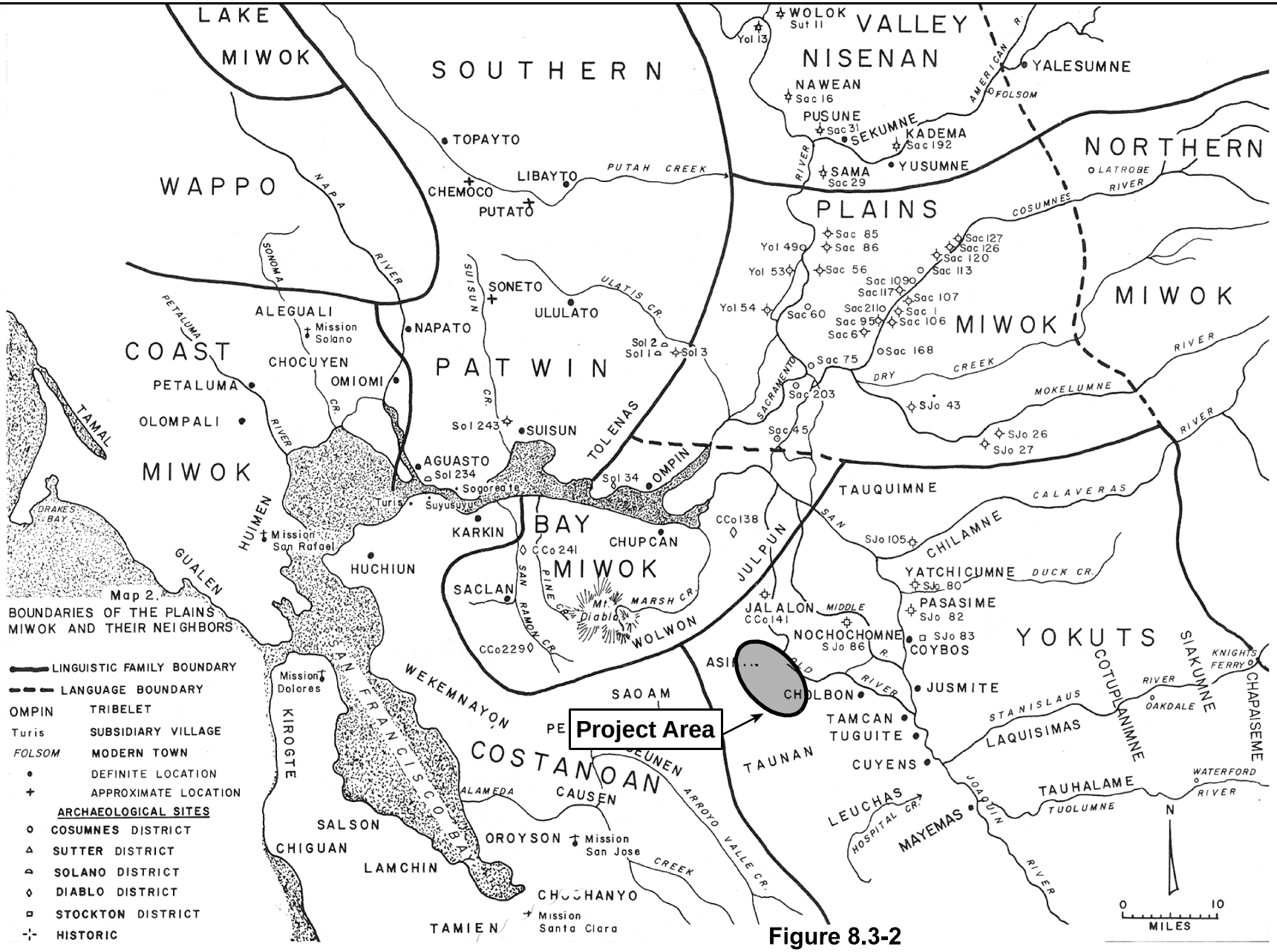

Figure 8.3-2
ETHNOGRAPHIC TRIBELETS
(Bennyhoff 1977, Map 2)
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

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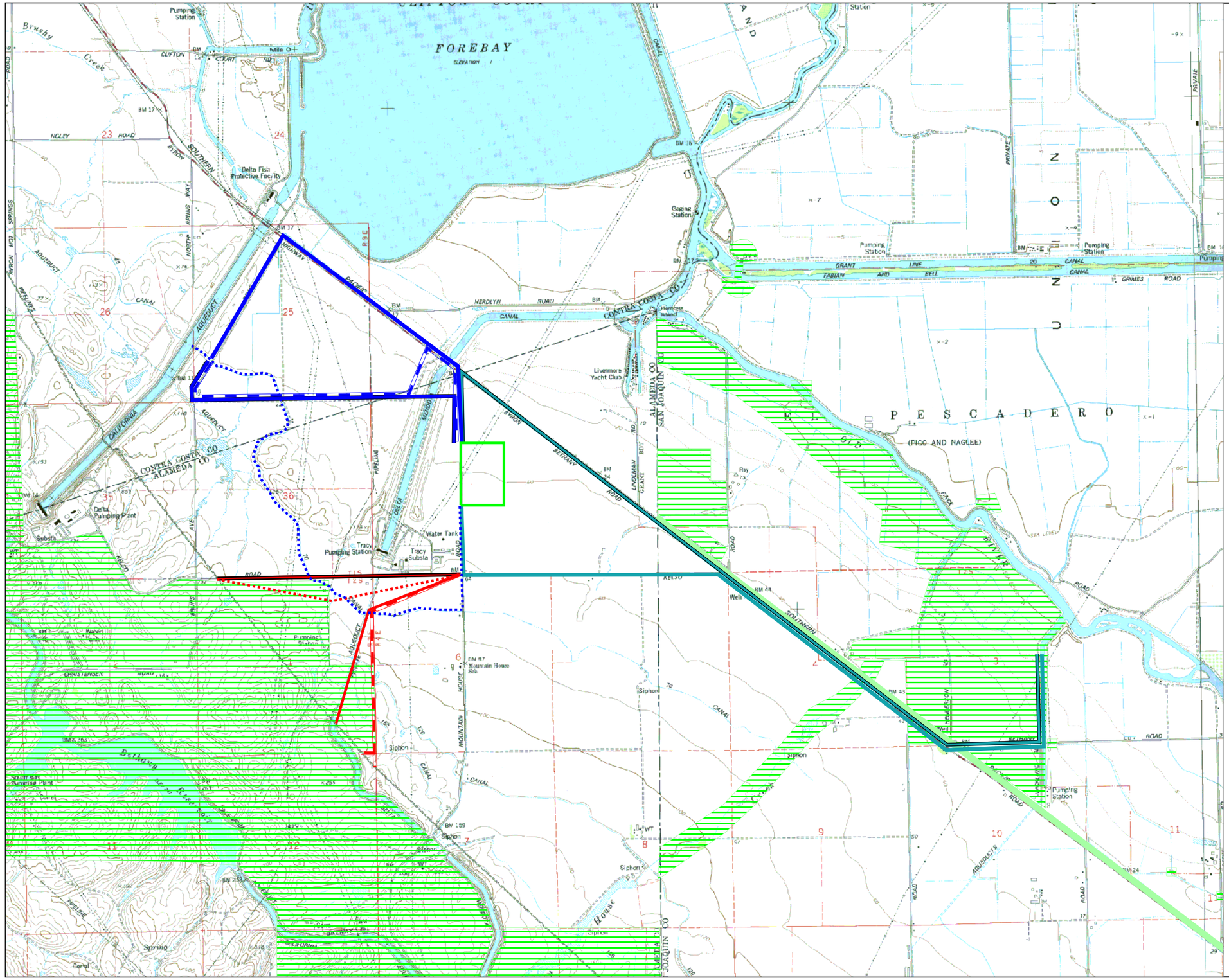

FIGURE 8.3-3
ARCHAEOLOGICAL COVERAGE SURVEY MAP

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

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Figure
8.3-4 Confidential Known Archaeological or Historical Sites Submitted as a Confidential Figure

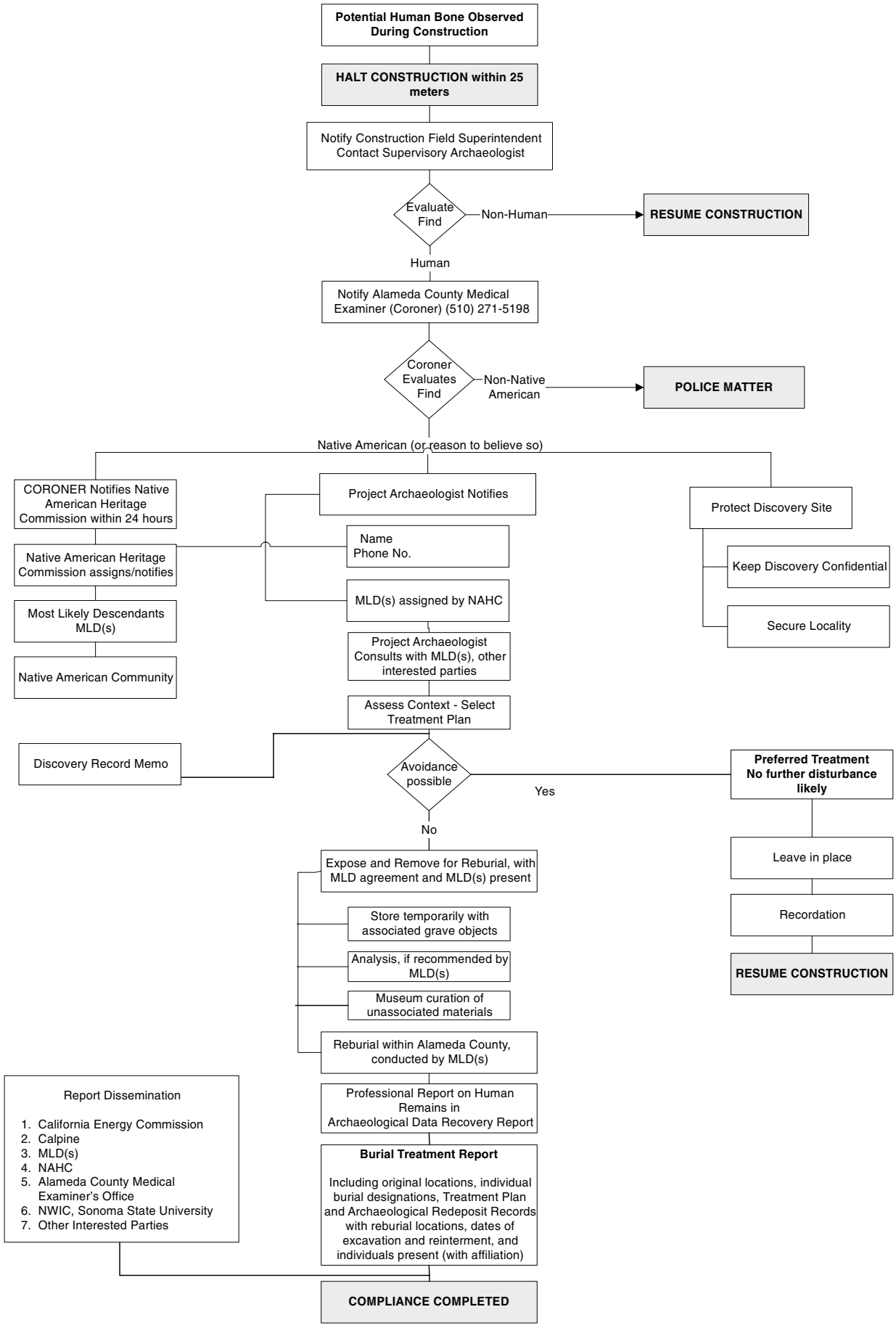

FIGURE 8.3-5
CONSTRUCTION PROGRAM BURIAL PLAN
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

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8.4 Land Use

This section provides an inventory of existing and designated land uses at the site and along the proposed alternatives for the natural gas supply, transmission, and waterline corridors. It also evaluates the applicable land use plans and policies. Section 8.4.1 is a brief overview of the affected environment and describes existing land uses and zoning designations in the study area (i.e., within 1.0 mile of the proposed site and within 0.25 mile of the project's linear facilities). Section 8.4.2 describes the future growth potential of the project area. Section 8.4.3 discusses the land use planning and control framework surrounding the project and adopted local, regional, state, and federal land use plans and permits applicable to the proposed project. Section 8.4.4 discusses the discretionary reviews by public agencies initiated or completed in the 18 months prior to filing the AFC. Section 8.4.5 presents an assessment of potential land use impacts of the project, and the project's compatibility with existing and designated land uses and applicable plans and policies. Section 8.4.6 discusses cumulative impacts and mitigation measures, and Section 8.4.7 lists the references used in preparing this section.

Land use is controlled and regulated by a system of plans, policies, goals, and ordinances that are adopted by agencies with land use authority over a particular area. Generally, if a parcel is in an incorporated city, it is regulated by that city. If the parcel is not located in a city, then the county has jurisdiction. The site and linear project features are in several planning jurisdictions, as summarized in Table 8.4-1 and Figure 8.4-1, and discussed below.

TABLE 8.4 –1
Summary of Project Feature Jurisdictions

Project Feature	Land Use and Planning Jurisdiction
Energy Facility	Alameda County
Electrical Transmission Alternative 1a, 1b	Alameda County
Natural Gasline Alternative 2a, 2c, 2d, 2e	Alameda County
Waterline Alternative 3a, 3b, 3d, 3e	Alameda County, Contra Costa County
Recycled Waterline Alternative 4a, 4b	Alameda County, San Joaquin County

Site and linear features are in the following planning jurisdictions:

East Altamont Energy Center. The site is in the jurisdiction of Alameda County.

Natural Gasline Alternatives 2a, 2c, 2d, and 2e. All alternatives are in Alameda County.

Electrical Transmission Line Alternatives 1a and 1b. All alternative transmission lines are in Alameda County.

Waterline Alternatives 3a, 3b, 3d, and 3e. Waterlines on the northern portion of Bruns Road and Byron Bethany Road are in Contra Costa County and the southern portions of the linears are in Alameda County.

Recycled Waterline Alternatives 4a and 4b. Both alternatives are in San Joaquin County east of Kelso Road. Alternatives are in Alameda County everywhere 0.5 mile west of Kelso Road. Both alternatives would pass through the proposed community of Mountain House, which is currently part of unincorporated San Joaquin County.

8.4.1 Affected Environment

Alameda County encompasses 737.5 square miles and borders eastern San Francisco Bay. Contra Costa, San Joaquin, Stanislaus, and Santa Clara counties surround Alameda County. Alameda County contributes to the seven Bay Area counties through regional employment, housing, and agricultural resources.

The project site is located in northeastern Alameda County, near the Contra Costa and San Joaquin county borders. The *East County Area Plan* (ECAP, Alameda County, 1994), as modified by "Measure D," is the planning document applicable to this site. Measure D (the Save Agriculture and Open Space Initiative) passed during the November 7, 2000 election and it amended the ECAP to modify the location and definition of land uses in East Alameda County. The pattern of land use in east Alameda County comprises the three cities in the Tri-Valley with various areas of hilly open space terrain surrounding them on all sides. The historical land use pattern has resulted in a concentration of parks and water and resource management in the southwest, while agricultural uses predominate in the eastern third of the planning area. In many cases, land uses are shared (e.g., grazing is permitted in some parks). The Mountain House area, northeast of the Altamont Pass, is a separate area from the Tri-Valley in its geology and topography, and economically it is more a part of the Central Valley than the central San Francisco Bay area.

Major landmarks in the project vicinity include the Clifton Court Forebay approximately 2 miles to the north and Bethany Reservoir, approximately 2.5 miles to the southwest, and the Byron Airport, approximately 3 miles to the northwest. The site is located approximately 8 miles northwest of the city of Tracy, 12 miles east of Livermore, 5 miles south of Byron, and less than 1 mile from the San Joaquin County border and the Mountain House Community Service District (MHCSD), a new town just starting Phase 1 construction. Large infrastructure projects dominate the landscape around the project. The Western substation, two pumping stations for the Delta-Mendota Canal and the California Aqueduct, PG&E's gas compressor station, numerous windfarms, four 500-kV transmission lines, nine 230-kV transmission lines and several lower voltage lines are located in the vicinity of the project.

8.4.1.1 Existing Land Uses and Planning Designations

The General Plan is a vision statement for future development. It contains goals and policies to guide development. The zoning ordinance is a regulatory tool used to implement the General Plan. It contains design requirements such as setbacks and height limits, as well as defined zoning districts that dictate permitted uses.

Definitions of General Plan and zoning designations in the project vicinity are described in Table 8.4-2. Existing land uses and zoning designations for the proposed site and vicinity, along with the project's linear features, are presented in Table 8.4-3.

East Altamont Energy Center Site. The site (Figure 8.4-1) is located on a 174-acre parcel near the northeast intersection of Mountain House Road and Kelso Road. The site is bounded to the north by Byron Bethany Road, to the south by Kelso Road, and to the west by Mountain House Road. The parcel is currently being used for grazing and to farm oats, alfalfa, and hay crops, and occasionally row crops, such as tomatoes. The site had been previously used for dairy cows. Also, a single-family residence, which would be vacated prior to the construction and operation of the project, currently exists on the property.

TABLE 8.4-2
Planning Designation Definitions in Project Vicinity

General Plan Land Use Designation	Examples of Permitted Uses		
	Alameda County	**Contra Costa County**	**San Joaquin County**
Large Parcel Agriculture	Agriculture, agricultural processing facilities, agricultural support service uses, secondary residential units, visitor-serving facilities, commercial recreational uses, public and quasi-public uses, solid waste landfills and related waste management facilities, quarries, wind farms, utility corridors, and similar uses compatible with agriculture	Not applicable	Not applicable
Agricultural Lands (AL)	Not applicable	Lands capable of production of food, fiber and plant materials, other types of agricultural uses, open space, or non-urban uses such as landfills, and low-density residential. Special uses include agricultural processing facilities, commercial agricultural support services, small-scale visitor uses	Not applicable
Major Public/ Public/Semi-Public (PS)	"Major Public" designation covers the area occupied by the Tracy Substation and adjacent transmission corridor.	Includes properties owned by public governmental agencies, as well as privately owned transportation and utility corridors. Wide variety of public and private uses allowed in plan category, but private residential and commercial uses are not considered compatible	Operated or maintained by a government agency or public utility, including schools, hospitals, prisons.
Water Management/ Water (WA)	Water Management designation comprises the Delta Mendota Canal and California Aqueduct areas.	Includes the Sacramento-San Joaquin estuaries	Not applicable
Agricultural – Urban Reserve	Not applicable	Not applicable	Areas currently undeveloped and perhaps in agricultural production. Expected to be converted to urban uses at some point, most likely beyond the planning period of the General Plan. Use shall not require a significant investment in facilities or permanent structures which are not compatible with the future urban development. General plan amendment is required before urban development is permitted.

TABLE 8.4-2
Planning Designation Definitions in Project Vicinity

General Plan Land Use Designation	Examples of Permitted Uses		
	Alameda County	**Contra Costa County**	**San Joaquin County**
Industrial	Not applicable	Not applicable	Areas encompassing a wide range of industrial activities that may (1) typically involve moderate to high nuisances for surrounding uses to be mitigated (General Industrial) or (2) typically involve limited impacts (Limited Industrial).
Commercial	Not applicable	Not applicable	Development involving the distribution and sale or rental of goods and/or the provision of services.
Residential	Not applicable	Not applicable	Development consisting of single-family dwellings, apartments, institutions, mobile homes, group quarters, hotels and motels, convalescent hospitals and rest homes.
Public	Not applicable		Operated or maintained by a government agency or public utility, including schools, hospitals, prisons.
Major Parks **Parks/Open Space**	Bethany Reservoir, located 2.5 miles southwest of the project is designated as Major Park Under Measure D, the area around Bethany Reservoir and the eastern slope of the foothills are all designated as “Open Space/ Resource Management for Watershed Protection.”	Not applicable	Continuous open space which is readily accessible to the public at all times and specifically designed for the use and enjoyment of the public.

Sources: Alameda County (1994), Contra Costa Planning Department (1996), San Joaquin General Plan (1992), Baseline Environmental Consulting (1994).

TABLE 8.4-3
Existing Land Uses and Planning Designations

Project Component	Existing Land Uses	County					
		General Plan Designation			Zoning Designation		
		Alameda	Contra Costa	San Joaquin	Alameda	Contra Costa	San Joaquin
Proposed Site	Agricultural	Large Parcel Agricultural	Not applicable	Not applicable	Agricultural	Not applicable	Not applicable
Site Vicinity[a]	Agricultural and related uses (pastures, stockponds, vineyards) Major public uses Major park and recreation	Large Parcel Agricultural Major public utility and other public uses Bethany Reservoir	Agricultural Lands (AL) Public/Semi-Public (PS) Water (WA)	Urban Reserve	Agricultural	Agricultural (A2, A3, A4)	General Agricultural
Electrical Transmission Lines 1a, 1b	Agricultural and related uses (pastures, row crops)	Large Parcel Agricultural	Not applicable	Not applicable	Agricultural	Not applicable	Not applicable
Gasline Alternative 2a, 2c, 2d, 2e[b]	Agricultural and related uses (pastures, stockponds, vineyards) Low-density residential Water management Utility	Large Parcel Agricultural	Not applicable	Not applicable	Agricultural	Not applicable	Not applicable
Waterline Alternative 3a, 3b, 3d, 3e	Agricultural and pastureland Water management Utility	Large Parcel Agricultural	Agricultural Lands (AL) Public/Semi-Public (PS)	Not applicable	Agricultural	Agricultural (A2, A3, A4)	Not applicable

TABLE 8.4-3
Existing Land Uses and Planning Designations

Project Component	Existing Land Uses	County					
		General Plan Designation			Zoning Designation		
		Alameda	Contra Costa	San Joaquin	Alameda	Contra Costa	San Joaquin
Waterline Alternative 4a, 4b	Agricultural and pastureland Utility Railroad	Large Parcel Agricultural	Not applicable	Urban Reserve Industrial Residential (Mountain House) Commercial Public Parks/Open Space	Agricultural	Not applicable	General Agriculture Agricultural-Urban Reserve Residential Industrial Public

Sources: East County Area Plan (1994), Contra Costa General Plan (1996), San Joaquin General Plan (1992), FEIR for Mountain House Master Plan and Specific Plan I and zoning codes and maps for respective jurisdictions.

[a]Land Use and Zoning for Project Vicinity is 1-mile radius from center of proposed site.

[b] Land Use and Zoning for all linear facilities include ¼-mile radius.

8.4.1.2 Project Vicinity

The predominant land uses in the project vicinity are large parcel agricultural, electric utilities, highways, recreation, a mainline railroad, and water management projects. Major Public uses in the vicinity consist of the Tracy substation, located on the west side of Kelso Road, comprising the substation and major transmission line corridors north of it. Bethany Reservoir is a major park, located approximately 2.5 miles to the southwest. The ECAP specifies goals for preserving viewsheds and other aesthetic characteristics of this area. Two major water projects, defined as "Water Management" features in the ECAP, are the California Aqueduct and the Delta-Mendota Canal, both located 2 miles southwest of the project. The area comprising the two water projects, the reservoir, and the east slope of the coastal foothills is designated for "open space/ Resource Management; watershed protection" in Measure D. The project is outside the Urban Growth Boundary (UGB) designated in the ECAP.

The UGB demarcates the limit of intensive urban development other than that allowed in the land use designations. Power generation facilities are not specifically listed as a permitted or conditional use for agriculturally zoned districts in Alameda County, although wind farms, a type of generating facility, are specifically listed. However, the general provisions of the Alameda County Code allow for public utility uses in any zoning district with appropriate review and approval by the County Planning Commission (Chapter 17).

Alameda County staff have stated that the EAEC constitutes a permittable use in the agricultural zoning district subject to a conditional use permit. Since the CEC certificate is in lieu of the conditional use permit pursuant to Public Resources Code Section 25500, the County administration of this provision would be in the form of comments to the CEC.

Utility infrastructure is an existing land use within 1 mile of the project site. Electrical substations and several transmission towers are located immediately west of the site along Kelso Road (Western substation). Transmission lines cross from southwest to northeast over the project site. Several windfarms are located west and south of the project. Water management projects in the vicinity include the California Aqueduct, Delta-Mendota Canal, and two pumping stations to the west. Bethany Reservoir, a major park, is 2.5 miles distant. Byron Bethany Road bounds the site to the north. Other land uses in the vicinity of the project and linears are summarized in Table 8.4-3. A few residences exist within 1 mile of the site.

Agricultural Resources and Prime Farmlands. Agricultural resources exist on the project site and in the vicinity of the site, and are discussed in detail in Section 8.9. Prime agricultural lands are addressed below.

The designations of Important Farmlands in the project vicinity are shown on Figure 8.4-2 (CDC, 1998). This map is derived from information provided from the Farmland Mapping and Monitoring Program (FMMP) administered by the Division of Land Resource Protection in the California Department of Conservation.

The designation of prime farmland is also considered with respect to specific soil mapping units as indicated in the NRCS soil surveys. The NRCS defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

The Important Farmland Map (Figure 8.4-2) shows that a majority of the project area is considered as Prime Farmland (P), Farmlands of Statewide Importance (S), Unique Farmlands (U), or Farmlands of Local Significance (L). The most notable exceptions to this are the Grazing lands (G) in the western portion of the project area and Urban and Built-up lands (D), or Other Lands (X) along the Delta-Mendota Canal and the area around the Tracy substation.

Alameda County has 10,500 acres of prime, unique, and agricultural lands of state importance.

The Alameda County General Plan for the project area is the East County Area Plan (ECAP). Policies 75 and 76 in the ECAP address potential losses of agricultural lands as follows:

> ***"Policy 75.*** The County shall conserve prime soils (Class I and Class II, as defined by the USDA Soil Conservation Service Land Capability Classification) and Farmland of Statewide Importance and Unique Farmland (as defined by the California Department of Conservation Farmland Mapping and Monitoring Program) outside the Urban Growth Boundary.
>
> ***Policy 76.*** The County shall preserve the Mountain House area for intensive agricultural use. "Intensive agricultural use" is defined as high yield agricultural production including vineyards, orchards, and row crops as distinguished from low-intensity agriculture such as cattle and horse grazing."

While the project would remove up to 55 acres of prime agricultural lands, it would also preserve up to 119 acres for agricultural use. The individual losses to agriculture are estimated at less than 1 percent of available prime, unique, and lands of statewide importance, according to CDC.

All of the project site and most of the project linears are either on or adjacent to farmlands identified as of prime importance. In real terms, construction of the project site would result in the conversion of up to 55 acres of land from agricultural use because water and gas pipelines would either be constructed in or adjacent to road rights-of-way where agricultural uses are absent, or would be re-contoured to allow agricultural uses after installation.

Transportation Routes. Transportation routes to the project site are Byron Bethany Road to the north and east, Kelso Road to the south, and Mountain House Road to the west. Additional roads connecting the routes to the site are Grant Line Road, I-205, I-580 and State Route 4. See Section 8.10 for further discussion of transportation routes in the area.

Sensitive Receptors. The site is rural and has very low density housing. Therefore, few sensitive receptor facilities (such as schools, daycare facilities, convalescent centers, or hospitals) occur in the vicinity of the project site. The nearest sensitive receptor is an elementary school located slightly over 1 mile south of the gas turbine exhaust stacks (Mountain House School). Also, a few rural residences are located in the vicinity of the site. Sensitive receptors within a 3-mile radius of the project site are shown on Figure 8.6-1, and descriptions of the receptors are presented in Table 8.12-1.

Recreation. In general, recreational facilities in the project vicinity are limited to boating activities allowed near Hammer Island and Clifton Court Forebay to the north of the site. The Livermore Yacht Club operates a marina south of Hammer Island, approximately 1 mile northwest of the project site. Byron Bethany Road is a designated Scenic Highway. A detailed discussion of visual resources is presented in Section 8.11.

The ECAP indicates that no community, regional, or state parks or trails exist or are planned in the vicinity of the project site or linears.

No regional or state recreational opportunities exist within 1/4 mile of any waterline alternative in Contra Costa County as described by the Contra Costa General Plan.

Parks and open space are proposed in the Mountain House General Plan in the vicinity of recycled waterline Alternatives 4a and 4b. Bethany Reservoir, a major park and recreation site, is 2.5 miles southwest of the project. No other regional or state recreational opportunities exist within 1/4 mile of the waterline Alternatives 4a and 4b in San Joaquin County as described by the San Joaquin County General Plan.

8.4.1.3 Electric Transmission Line

The corridor passes through land used for agricultural purposes. Existing land uses in the 0.5-mile-wide corridor along the route are agricultural, consisting of grazing pasture and row crops.

The proposed transmission line routes 1a and 1b are designated as Large Parcel Agriculture in the ECAP and zoned as Agriculture by the County of Alameda. See Figures 8.4-1 and 8.4-2 for land use and zoning information. Additional details about the electric transmission line are discussed in Section 5.0.

8.4.1.4 Natural Gas Supply Line

Natural gas for the facility will be delivered to the site via approximately 1.4 miles of new 20-inch pipeline that will connect to PG&E's main existing pipeline by one of four routes (Figure 2.1-1).

The preferred route is Alternative 2a. The Alternative 2a route follows an existing ROW, is zoned Agricultural, and is designated for Large Parcel Agricultural land use. Alameda County General Plan and zoning designations are shown on Figures 8.4-1 and 8.4-2, respectively. These designations are also described in Table 8.4-2. The alternative gas supply routes are described in Section 6.0, Natural Gas Supply.

8.4.1.5 Waterlines

Water supply linears to the site generally cross primarily agricultural lands. Land use and zoning information are shown on Figure 8.4-3. In general, all alternatives cross lands zoned for public and agricultural uses. Most of Alternatives 4a and 4b are in lands zoned for agricultural reserve, and proceed along Byron Bethany Road in the vicinity of residential, commercial, industrial, and public zoned uses in the community of Mountain House.

Alternative water supply routes are discussed in Section 7.0, Water Supply.

8.4.2 Future Growth Trends

According to the ECAP, growth in the eastern portion of Alameda County will be generally focused in the western portion of the county planning area, inside the UGB near the cities of Pleasanton, Hayward, Dublin, and Livermore. As discussed above, the nearest urbanized area to the project site in Alameda County is Livermore, approximately 12 miles to west.

The effect of Measure D on future growth trends has yet to be fully evaluated by the county, but the intent of the initiative was to constrain growth and preserve open space. Measure D protects large parcel agricultural lands and limits future growth to a rigid UGB that generally follows existing City boundaries and excludes many areas that were previously designated for potential future urban development under the ECAP. Measure D amended the ECAP by eliminating the "Urban Reserve" definition, and returning these areas primarily to large parcel agricultural designations. Measure D largely eliminates County participation in any significant development activities outside of the initiative-defined UGB. Measure D did not alter Section 17 of the Zoning Code regarding public utility uses or the inclusion of public uses, quasi-public uses, and utility corridors as allowable uses in Large Parcel Agricultural. The initiative refers extensively to residential development, and the impact would appear to limit higher density housing to the area within the UGB and to disallow dispersed housing throughout the open space areas of the county. Measure D passed recently and has already been challenged in court. The details of how Measure D will be implemented, as well as conforming differences in zoning specified in code and use designations specified in Measure D, are being worked out by the County.

Similar to Alameda County, Contra Costa County has produced an Urban Limit Line. Contra Costa County's Urban Limit Line requires that not less than 65 percent of the land in the County be preserved for parks, open space, agriculture, wetlands, and other non-urban uses. Future growth is expected to occur within the Urban Limit Line, and specifically in the Pittsburg-Antioch area in eastern Contra Costa County, north of the project area. The project vicinity and proposed linear facilities are outside the Urban Limit Line. The nearest urbanized areas in Contra Costa County are San Ramon and Danville, approximately 15 miles to the west and Brentwood, approximately 10 miles to the North.

According to the San Joaquin County General Plan, development and population increases are expected in the short-term for the southern portion of the county, including the areas of Tracy and Mountain House. The General Plan details specific policies for establishing limits of urban development and providing adequate infrastructure to meet the needs of the growing communities. Other areas of San Joaquin County that are growing include Lathrop, Manteca, and Ripon, in the central-southern portion of the county, east of the project area.

8.4.3 Land Use Planning and Control

8.4.3.1 Laws, Ordinances, Regulations, and Standards

This section lists the land use LORS that are applicable to the project. Land use is largely governed by General Plans and zoning ordinances. This section also discusses the applicability of the LORS to the proposed project. The jurisdiction of the site and linears is presented in Table 8.4-1. Table 8.4-4 presents a summary of the LORS applicable to those jurisdictions.

Federal. No federal LORS for land use are applicable to the site or project.

State. The following are state LORS applicable to the site/project.

CEQA Compliance. The AFC process is CEQA-equivalent under the Warren-Alquist Act, and therefore fulfills the requirements of CEQA.

Delta Protection Act of 1992. The Delta Protection Act of 1992 was passed to direct the Delta Protection Commission to prepare a comprehensive resource management plan for land uses in the Primary Zone of the Delta. The purpose of the plan is to protect the Primary Zone of the Delta from potential urban and suburban encroachment and to protect the area for agriculture, wildlife habitat, and recreational uses. The Act includes parts of San Joaquin and Contra Costa counties, but does not extend into Alameda County.

The Delta Planning Commission has authority over land use in areas of the Primary Zone, whereas local agencies have authority over uses in the Secondary Zone. The proposed project and project linears exist in the Secondary Zone. Therefore local land use jurisdiction would apply (Figure 8.4-4). As of 1999, Contra Costa and San Joaquin counties have incorporated guidance for the Primary Zones from the Commission into their general plans (Klamuro, pers. Comm). Specific planning department contacts involved in the incorporation of this guidance are provided in Table 8.4-4.

Local.

General Plans. Land use provisions must be included in every California city and county General Plan (California State Planning Law, Government Code §65302 et seq.) and reflect their goals and policies. These policies guide the physical development of land in their jurisdiction. A brief overview of the land use elements in the three county General Plans is provided below along with a description of their applicable policies.

Implementation of the project would not require amendment to the general plans for Alameda, Contra Costa, and San Joaquin counties, or the community of Mountain House. The ECAP and Measure D allow for siting quasi-public uses and utility corridors in the Large Parcel Agricultural land use designation. The proposed project is consistent with the land use plan designation for Alameda County.

ECAP Policy 75 states the County shall conserve Prime Soils, Farmland of Statewide Importance, and Unique Farmland. Policy 76 states the County shall preserve the Mountain House area for intensive agricultural use.

Construction of the project site would remove up to 55 acres of land currently classified as prime agricultural land from the resources of Alameda County. However, the project would also preserve agricultural uses on the remaining 119 acres. Alameda County has 10,500 acres of prime, unique, and agricultural lands of state importance. Loss of less than 1 percent for this use is not considered to be individually significant.

TABLE 8.4-4
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Land Use

LORS	Applicability	AFC Conformance Section	Agency/Contact
Alameda County East County Area Plan (1994)	Describes policies for land use, circulation, community facilities, and environmental resource management for the plan area. The ECAP draws a permanent boundary to differentiate lands in the East County suitable for urban development and lands suitable for agriculture, biological habitat, open space and recreation, production of wind power or mining, and open space buffers to separate communities. This boundary encloses sufficient lands to accommodate projected growth through 2010 and to achieve state-mandated housing targets. The boundary will contain growth, prevent sprawl, and help control speculation in remote areas by eliminating guesswork about future land use decisions. The plan recognizes that compact development results in more efficient use of land and infrastructure and less conversion of open space than low-density sprawl. The plan specifies a major new urban development in north Livermore with a holding capacity of approximately 12,500 housing units. The ECAP specifies that new developments dedicate or acquire land or pay equivalent in-lieu fees to the Alameda County Open Land Trust. Finally, the County will work with the East County cities to develop a comprehensive open space preservation program for lands outside the UGB, including land north of the UGB in North Livermore.	Table 8.4-6	Alameda County Community Development Agency, Planning Department Bruce Jensen, Senior Planner 399 Elmhurst St, Rm 136 Hayward, CA 94544 510-670-6527
"Measure D"	Amends the ECAP to constrain growth to the UGB and preserve open space. It eliminates the County from participation in authorizing any significant development outside the initiative-defined UGB (absent a vote by the Alameda County electorate). Measure D specified that the number of parcels, maximum floor areas, number of residential units, floor area ratios, and uses in agricultural, resource management, water management, and rural residential areas could not be increased. Notwithstanding the permanency goals of the ECAP (see above), Measure D redesignated areas outside the UGB that were designated Urbane Reserve as Large Parcel Agriculture, subject to certain conditions. The Urban Land Reserve definition was deleted from the ECAP. Measure D defined UGBs around Pleasanton, Dublin, and Livermore. In areas designated large parcel agriculture, Measure D permits limited agricultural enhancing commercial uses that primarily support the area's agricultural production. Subject to the provisions of Measure D, large parcel agriculture permits agricultural uses,	Table 8.4-6	Bruce Jensen, Senior Planner Alameda County 510-670-6527

TABLE 8.4-4
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Land Use

LORS	Applicability	AFC Conformance Section	Agency/Contact
	limited agricultural support services and public and quasi-public uses, windfarms and related facilities, and utility corridors.		
Alameda County Zoning Ordinance (2000)	Establishes classes of zoning districts governing the use of the land and the placement of buildings and improvements in districts.	Table 8.4-6	Same as above
Contra Costa County General Plan (1996)	Describes policies for land use, circulation, community facilities, and environmental resource management for the plan area. It is a statement of the area's vision of its ultimate physical development.	Table 8.4-6	Contra Costa County Planning Department Patrick Roache, Sr. Planner 651 Pine St., 4th Flr., North Wing 925-335-1242
Contra Costa County Zoning Ordinance (2000)	Establishes classes of zoning districts governing the use of the land and the placement of buildings and improvements in districts.	Table 8.4-6	Same as above
San Joaquin County General Plan (1992)	Describes policies for land use, circulation, community facilities, and environmental resource management for the plan area. It is a statement of the area's vision of its ultimate physical development.	Table 8.4-6	San Joaquin County Planning Department. Jeff Fischer, Planner 1810 East Hazelton Avenue Stockton, CA 95205 209-468-2193 Mountain House Project Planner: Michael Hitchcock 209-468-8597
San Joaquin County Zoning Ordinance (2000)	Establishes classes of zoning districts governing the use of the land and the placement of buildings and improvements in districts.	Table 8.4-6	Same as above
Delta Protection Commission	Guidance for the protection of Delta resources incorporated into the general plans of Contra Costa and San Joaquin counties.	Section 8.4.3.1 and Table 8.4-6	San Joaquin County Planning Department Jim Van Buren, Sr. Planner for Delta Protection Act guidance in General Plan 209-468-2374 Roberta Goulard, Sr. Planner for Delta Protection Act guidance in General Plan 925-335-1226

Zoning Ordinances. Alameda, Contra Costa, and San Joaquin counties' zoning ordinances are enforced by their respective planning and building departments. In consultations between the Applicant and Alameda County, the county has indicated that the project constitutes a permittable use in the agricultural zoning district subject to a conditional use permit. Since the CEC certificate is in lieu of the conditional use permit pursuant to Public Resources Code Section 25500, the County administration of this provision would be in the form of comments to the CEC.

The linear facilities for the project are consistent with the zoning for each of the three counties. Chapter 17.52.020 of the Alameda County Code permits public utility uses in any district, including underground, linear facilities. Contra Costa County does not have zoning restrictions on the installation of underground, linear utilities in the public rights-of-way. (Kainan, pers. Comm.) Chapters 9-505.5 and 9-600.1 of the San Joaquin County Code state

utility use for lands zoned as Urban-Reserve and Industrial are permitted subject to site approval. The site approval process is described in Chapter 9-818 of the San Joaquin County Code and is summarized in Table 8.4-5.

Related Permits.

Alameda County Site Development Review. The Alameda County General Code, Section 17.54.210, Site Development Review requires the planning department to determine if a proposed site development relates properly to existing and surrounding land uses and for the following reasons:

> "Site development review is intended to promote orderly, attractive, and harmonious development; recognize environmental limitations on development; stabilize land values and investments; and promote general welfare by preventing establishment of uses or erection of structures having qualities which would not meet the specific intent clauses or performance standards of this title or which are not properly related to their sites, surroundings, traffic circulation, or their environmental setting. Where the use proposed, adjacent land uses, environmental significance or limitations, topography or traffic circulation is found to so require, the planning director may establish more stringent regulations than those otherwise specified for this district."

Just as the CEC process affects the ordinary implementation of the county conditional use permit process, so here the implementation of county site development review is altered. Procedurally, the Applicant anticipates that this site development review will be conducted by County staff as part of their comments on the CEC application.

San Joaquin County Pumping Station Site Review.

The project includes a pumping station to be located in San Joaquin County which, but for the CEC preemption, would require County Site Approval pursuant to county ordinance. As with the site development review for the power plant itself by Alameda County discussed above, the Applicant anticipates that San Joaquin County will conduct such review and present its conclusions in comments to the CEC.

Encroachment Permits. As a matter of law, encroachment permits are preempted by the CEC certificate and are not required. However, the Applicant intends to apply for and obtain these ministerial permits as a courtesy to help maintain consistency with county processes and recordkeeping. Encroachment permits will be sought to install natural gas and waterlines in the three counties in public rights-of-way and will be authorized by the respective county public works department. Encroachment, as defined by all three counties, includes excavating or disturbing the right-of-way; and or constructing, installing, or maintaining a cable, conduit, pipe or other equipment in the right-of-way. In general, the applications require a complete description of the proposed encroachment, a list of supporting documentation, copies of referenced plans and specifications, and evidence of insurance. The project proponent will apply for an encroachment permit subsequent to final certification by the CEC. The approval process for the encroachment permit typically will take 3 to 5 weeks.

TABLE 8.4-5
Land Use-Related Compliance Needed for Project Approval

Compliance Needed	Document and Page	Applicability	AFC Conformance Section	Agency/Contact
Alameda County Site Development and Review	Alameda County General Ordinance Title 17 Section 17.54.210 Site development review	Development of a quasi-public use in an agriculturally-zoned area	8.4.3.1.3	Alameda County Community Development Agency, Planning Department Bruce Jensen, Senior Planner 399 Elmhurst St, Rm 136 Hayward, CA 94544 510/670-6527
Alameda County Encroachment Permit	Alameda County General Ordinance, Title 12 Chapter 12.08 Roadway Use Regulations	Installation of natural gas and waterline facilities for project	8.4.3.1.3	Alameda County Public Works Agency, Development Services John Rogers 399 Elmhurst St. Hayward, CA 94544-1395 510/670-5429 X55429
San Joaquin Community Development Department Site Review	San Joaquin County Development Title, Chapter 9-818	Permitted use subject to site review (installation of utilities in Urban-Reserve and Industrial zones)	8.4.3.1.3	San Joaquin County Planning Department Jeff Fischer, Planner 1810 East Hazelton Avenue Stockton, CA 95205 209/468-2193
Contra Costa County Encroachment Permit	Contra Costa County Code Title 10 Public Works and Flood Control	Installation of natural gas and waterline facilities for project	8.4.3.1.3	Contra Costa County, Permit Assistance Center Bob Hendry, Public Works Permitting Engineer 651 Pine Street, 2nd Floor, North Wing Martinez, CA 94553 916/335-1375
San Joaquin County Encroachment Permit	San Joaquin County Street and Highways Code Div. 1 Ch. 3, Div. 2 Ch. 2, 4, 6. San Joaquin County Ordinances 324, 441, 648, 662, 672, 695, 700, 860 and 892.	Installation of natural gas and waterline facilities for project	8.4.3.1.3	San Joaquin County, Public Works Department Reed Campbell, Public Works Permitting Engineer 1810 East Hazelton Avenue Stockton, California 95205 209/468-3023

Sources: Alameda County General Ordinance, Contra Costa County General Ordinance, San Joaquin County General Ordinance, Delta Protection Act.

8.4.4 Discretionary Reviews by Public Agencies

According to the Alameda County Planning Department, no major on-going development projects are occurring in the general vicinity of the project (Sawrey-Kubicek, 2000).

No major development projects are planned in Contra Costa in the project vicinity. The Contra Costa General Plan discusses the proposed development of the East County Airport and Los Vaqueros Reservoir as two major public works projects planned for future development in Eastern Contra Costa County.

According to the San Joaquin County Planning Department, two major on-going projects in the general vicinity of the project site are taking place near Tracy. (San Joaquin County, pers. Comm. 2000). The Mountain House development project recently received its first permit for subdivision development, and completed buildout (2014 to 2034) will result in a population of approximately 40,000 residents. The Patterson Pass Business Park is a major commercial development southwest of Tracy near Interstate-580, approximately 12 miles from the site, for which a special purpose plan has been prepared. The Business Park includes grocery warehouse operations and an auto auction facility. Development permits will be issued for both projects in the next few years.

Database searches in the San Francisco Chronicle, Tri-Valley Herald, and Alameda Times-Star for the past 60 days (September through November) did not produce any additional results on reports for community development in the project vicinity.

8.4.5 Environmental Consequences

8.4.5.1 Significance Criteria

Significance criteria for impacts to land use were determined through review of applicable state and local regulations. The following criteria were used to evaluate the potential environmental impacts of the project:

- Physically divide an established community?
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?
- Conflict with any applicable habitat conservation plan or natural community conservation plan?

8.4.5.2 Potential Effects on Land Use

According to the ECAP, Eastern Alameda County has addressed future development and conservation by differentiating between permanently delineated areas suitable for urban development and areas suitable for other uses. Lands within the Urban Growth Boundary are based on physical characteristics conducive to urban development and the ability to provide urban-level services. Lands outside of the boundary include agriculture, biological habitat, quasi-public uses, open space and recreation, production of windpower or mining, and open space buffers to separate communities. The project is compatible with the existing ECAP land use designation and will be sited near existing, similar land uses. The project will support County goals to provide electrical utilities.

East Altamont Project Site and Surrounding Area. As defined in the CEQA Checklist, the project will not have a significant land use impact on the surrounding area. The site consists of undeveloped land used for agricultural purposes and is isolated from higher-density residential areas to the east and west by agricultural land use and zoning buffers. Its design and landscaping plan are intended to allow it to be compatible with continued agricultural uses in the vicinity (refer to Section 8.9 for more information on conformance with agricultural resource policies and Section 8.11, Visual Resources, for more information on

aesthetics and visual impacts). The project constitutes a permittable use in the agricultural zoning district subject to a conditional use permit. Since the CEC certificate is in lieu of the conditional use permit pursuant to Public Resources Code Section 25500, the County administration of this provision would be in the form of comments to the CEC.

ECAP Policy 75 states the County shall conserve Prime Soils, Farmland of Statewide Importance, and Unique Farmland. Policy 76 states the County shall preserve the Mountain House area for intensive agricultural use.

Construction of the project site would remove up to 55 acres of land currently classified as prime agricultural land from the resources of Alameda County. However, the project would also preserve agricultural uses on the remaining 119 acres. Alameda County has 10,500 acres of prime, unique, and agricultural lands of state importance. Loss of less than 1 percent for this use is not considered to be individually significant.

The impact of temporary construction activities will be insignificant because the surrounding area is generally undeveloped and has a low-density residential population that would potentially experience the construction activities. For a more detailed account of temporary construction impacts related to dust, noise, and traffic, see Sections 8.1, 8.5, and 8.10, respectively.

Alameda County does not presently have any approved regional habitat conservation plan or natural community conservation plan. Therefore, the project would not conflict with the goals of such a plan.

Transmission Line Routes. The transmission line routes would not have a significant permanent land use impact under the CEQA Checklist, and are compatible with the underlying zoning and surrounding land uses.

Natural Gas Pipeline and Waterline Routes. The proposed natural gas pipeline and waterline routes would not have a significant impact on land uses of the surrounding area. All natural gas supply pipelines, water supply, and recycled water supply pipelines would be underground, and therefore would not limit the continued uses of these areas for their currently designated uses (e.g., agriculture).

8.4.5.3 Compatibility with Plans and Policies

The proposed project is consistent with the goals and policies of applicable plans. Table 8.4-6 provides a summary of the project's consistency and conformity with these applicable plans. Conformity with visual resource policies is provided in Section 8.11.

8.4.6 Cumulative Impacts

The CEQA Guidelines (Section 15355) define cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts."

The CEQA Guidelines further note that:

> The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable

future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

The development of the project is consistent with other major existing land uses in the vicinity, including the substations, transmission lines, and pumping stations located nearby. The project has been sited away from planned, residential development. Adequate buffering from residential developments is achieved through surrounding land use. Potential impacts to the aesthetic quality of the area are mitigated as discussed in Visual Resources (Section 8.11).

The project would convert up to 55 acres of prime agricultural lands to public utility uses. Although the loss of less than 1 percent of agricultural lands in Alameda County is not individually significant, it does contribute to losses resulting from other developments and this is not consistent with ECAP Policies 75 and 76. However, the project would encourage the protection of agriculture by maintaining the remaining 119 acres of the project parcel in agriculture. Because EAEC purchases water at industrial rates, it lowers the cost of water to agricultural users in BBID's district, which encompasses 17,000 acres in Alameda, Contra Costa, and San Joaquin counties.

The parcel currently is designated as Large Parcel Agricultural in the ECAP and Measure D. Allowable uses within this category include public uses, quasi-public uses, wind farms, and utility corridors provided that they are appropriate for remote areas and are determined to be compatible with agriculture. The project is appropriate for remote areas, in comparison to more populated areas to the west and southeast. Although the project is anticipated to result in a minor loss of agriculturally productive lands, it avoids "leapfrogging" development that could result in the premature loss of agriculture because it is sited near similar existing and planned uses. The reduction in agricultural land is not considered a significant project-specific impact to the region; see Section 8.9 for further discussion.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
East County Area Plan		
	Goal:	
	Policy 14: The County shall work with cities and service districts to plan adequate infrastructure capacity to accommodate development consistent with the East County Area Plan.	✓Because the project is self-sufficient for water and waste disposal, no additional infrastructure improvements are necessary.
	Policy 75: The County shall conserve prime soils (Class I and Class II, as defined by the USDA Soil Conservation Service Land Capability Classification) and Farmland of Statewide Importance and Unique Farmland (as defined by the California Department of Conservation Farmland Mapping and Monitoring Program) outside the Urban Growth Boundary.	✓The project would remove less than 1 percent of agricultural lands in Alameda County, while preserving a 2:1 ratio of agricultural lands on the property. The project will remove up to 55 acres of prime agricultural land production, and intends to preserve the remaining 119 acres in agricultural production. This is considered less than significant on a project-specific basis but may be considered significant in conjunction with all other losses in the county.
	Policy 76: The County shall preserve the Mountain House area for intensive agricultural use. "Intensive agricultural use" is defined as high yield agricultural production including vineyards, orchards, and row crops as distinguished from low-intensity agriculture such as cattle and horse grazing.	✓The project would remove less than 1 percent of agricultural lands in Alameda County, while preserving a 2:1 ratio of agricultural lands on the property. The project will remove up to 55 acres of prime agricultural land production, and intends to preserve the remaining 119 acres in agricultural production. This is considered less than significant on a project specific basis but may be considered significant in conjunction with all other losses in the county.
	Policy 262: The County shall facilitate the provision of adequate gas and electric service and facilities to serve existing and future needs while minimizing noise, electromagnetic, and visual impacts on existing and future residents.	✓The project supports this policy by providing electrical supply.
Industrial/Commercial/Office Uses and Economic Development	Goal: *To promote economic development and to provide an adequate supply of industrial/commercial/office acreage to achieve an appropriate balance of jobs and housing.*	
	Policy 49: The County shall require new unincorporated industrial, commercial, and office developments to pay their fair share of the costs for providing East County infrastructure, public facilities and services, open space, affordable housing, and child care.	✓EAEC will pay development fees and taxes to the County, as would any other development. These fees go to pay for public services. Because the facility will have no more than 40 employees, this facility will be paying higher taxes relative to its impact than typical commercial or industrial development.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
Sensitive Lands and Regionally Significant Open Space	Goal: *To protect regionally significant open space and agricultural land from development.*	
	Policy 56: The County shall preserve open space areas for the protection of public health and safety, provision of recreational opportunities, production of natural resources (e.g., agriculture, windpower, and mineral extraction), protection of sensitive viewsheds [see definition in Table 1], preservation of biological resources, and the physical separation between neighboring communities [see Figure 4].	✓EAEC will develop conservation easements of 55 acres of similar property to ensure that open space remains prevalent in the area, or will pay in lieu fees into the Alameda County Open Space Land Trust. EAEC would have no effect on recreational opportunities. It has a less than significant impact on opportunities for agricultural development and mineral extraction, and preserves viewsheds, biological resources, and physical separation between the facility and neighboring communities. EAEC is consistent with Policy 56.
	Policy 58: The County shall approve only open space, park, recreational, agricultural, limited infrastructure, public facilities (e.g., limited infrastructure, hospitals, research facilities, landfill sites, jails, etc.) and other similar and compatible uses outside the Urban Growth Boundary.	✓The project is consistent with the County's policy to approve limited infrastructure to support existing development. EAEC is consistent with this policy.
	Policy 60: The County shall require all new developments, including those resulting from conversion of Urban Reserve, to dedicate or acquire land and/or pay equivalent in-lieu fees to the Alameda County Open Space Land Trust and shall encourage the cities to impose similar open space requirements on development in incorporated areas. Detailed development plans (e.g., specific plans) required for each phase of Major New Urban Development shall include a detailed open space program ensuring the preservation of land for open space use, sufficient funds to manage open space land, and the fair compensation of property owners.	✓EAEC will develop conservation easements of 55 acres of similar property to ensure that open space remains prevalent in the area, or will pay in lieu fees into the Alameda County Open Space Land Trust.
	Policy 73: The County shall work with San Joaquin, Contra Costa, and Santa Clara Counties to ensure that land uses adjacent to Alameda County open space lands are compatible with open space uses. The County shall ensure that land uses within Alameda County adjacent to San Joaquin, Contra Costa, and Santa Clara Counties are compatible with adjacent open space lands in these other counties.	✓The EAEC project is consistent with the large substation adjacent to it on the west side of Kelso Road. EAEC is placed in the center of its parcel in part to provide buffer areas for uses by adjacent counties.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
Agriculture	Goal: *To maximize long-term productivity of East County's agricultural resources.*	
	Policy 77: The County shall require buffers between those areas designated for agricultural use and new non-agricultural uses within agricultural areas or abutting parcels. The size, configuration and design of buffers shall be determined based on the characteristics of the project site and the intensity of the adjacent agricultural uses, and if applicable, the anticipated timing of future urbanization of adjacent agricultural land where such agricultural land is included in a phased growth plan. The buffer shall be located on the parcel for which a permit is sought and shall provide for the protection of the maximum amount of arable, pasture, and grazing land feasible.	✓ The project will preserve approximately 50 acres to the north and south of the project to provide buffers to uses north and south of the project. The project would further be set back from both the east and west boundaries to provide buffers to adjacent agricultural uses. EAEC is consistent with this policy.
	Policy 78: The County shall require that, where conflicts between a new use and existing use are anticipated, the burden of mitigating the conflicts be the responsibility of the new use.	✓ The project has proposed many mitigation measures and bears the burden of mitigating conflicts. EAEC is consistent with this policy.
	Policy 80: The County shall work with San Joaquin, Contra Costa, and Santa Clara Counties to ensure that any development adjacent to Alameda County agricultural land mitigates impacts on agricultural land including air quality, water quality and incompatibilities with agricultural uses. In particular, measures to mitigate growth-inducing impacts of development on agricultural land in Alameda County shall be addressed through cooperative efforts among the counties. The County shall ensure that land uses within Alameda County adjacent to San Joaquin, Contra Costa, and Santa Clara Counties are compatible with adjacent agricultural uses in these other counties.	✓ The project does not cause growth-inducing impacts because the power generated would be used to meet existing demand and the number of employees is small (less than 40). EAEC is consistent with this policy.
	Policy 90: The County shall encourage the establishment and permanent protection of existing and new cultivated agriculture through the use of homesite clustering, agricultural easements, density bonuses, or other means.	✓ The project would encourage the protection of agriculture by maintaining the remaining 119 acres of the project parcel in agriculture. EAEC is consistent with this policy.
	Policy 97: The County shall seek to stimulate agricultural investment and enhance the economic viability of existing or potential rural agricultural uses.	✓ The project stimulates agricultural investment and enhances the economic viability of existing agricultural uses by providing favorable lease prices for the remaining 119 farmed acres of the property. Because EAEC purchases water at industrial rates, it lowers the cost of water to agricultural users in BBID's district which encompasses 17,000 acres in Alameda, Contra Costa, and San Joaquin counties. EAEC is consistent with this policy.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
Sensitive Viewsheds	Goal: *To preserve unique visual resources and protect sensitive viewsheds.*	
	Policy 112: The County shall review development proposed adjacent to or near public parklands to ensure that views from parks and trails are maintained.	✓EAEC does not adversely impact sensitive viewsheds and is consistent with this policy. See Chapter 8.11 for extended analysis.
Airports	Goal: *To provide for the operation and expansion of the Livermore Municipal Airport and to ensure the compatibility of adjacent uses.*	
	Policy 140A: The County shall recognize the Byron (East Contra Costa County) Airport as a regional resource, and shall work with Contra Costa County to ensure that land uses approved in Alameda County within the Byron Airports' referral area are compatible with the airport's operations.	✓ Heights of structures are below levels that would affect the airport operations. EAEC is consistent with this policy.
Transportation Systems	Goal: *To create and maintain a balanced, multi-modal transportation system that provides for the efficient and safe movement of people, goods, and services.*	
	Policy 165: The County shall cooperate with cities and regional agencies to design transportation facilities and programs to accommodate *East County Area Plan* land uses.	✓ The project has few employees and will have a less than significant impact on transportation facilities. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.
	Policy 166: The County shall adhere to provisions of the Regional Transportation Plan, Countywide Transportation Plan, and County Congestion Management Program.	✓Project would implement measures to avoid contributing to local congestion. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.
	Policy 167A: The County shall require that all new development in areas that are unincorporated as of the adoption of the East County Area Plan shall contribute their fair share towards the costs of transportation improvements shown on the Transportation Diagram, subject to confirmation in subsequent traffic studies, as a condition of project approval.	✓The project will have a less than significant impact on transportation facilities. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.
Transportation Demand Management	Goal: *To reduce East County traffic congestion.*	
	Policy 169: The County shall seek to minimize traffic congestion levels throughout the East County street and highway system.	✓The project will have a less than significant impact on transportation facilities. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.
	Policy 170: The County shall seek to minimize the total number of Average Daily Traffic (ADT) trips throughout East County.	✓The project will have a less than significant impact on transportation facilities. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
	Policy 171: The County shall seek to minimize peak hour trips by exploring new methods that would discourage peak hour commuting and single vehicle occupancy trips.	✓The project will have a less than significant impact on transportation facilities. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.
	Policy 176: The County shall require new non-residential developments in unincorporated areas to incorporate Transportation Demand Management (TDM) measures and shall require new residential developments to include site plan features that reduce traffic trips such as mixed use development and transit-oriented development projects.	✓The project will have a less than significant impact on transportation facilities. See Section 8.10 for a detailed analysis. EAEC is consistent with this policy.
Police, Fire, and Emergency Medical Services	Goal: *To ensure the prompt and efficient provision of police, fire, and emergency medical facility and service needs.*	
	Policy 223: The County shall provide effective law enforcement, fire, and emergency medical services to unincorporated areas.	✓The project will have a less than significant impact on law enforcement, fire, and emergency medical services. See Section 8.8 for a detailed analysis. EAEC is consistent with this policy.
	Policy 225: The County shall require new developments to pay their fair share of the costs for providing police, fire, and emergency medical services and facilities.	✓EAEC will pay development fees and taxes to the County, as would any other development. These fees go to pay for public services. Because the facility will have no more than 40 employees, this facility will be paying higher taxes relative to its impact than typical commercial or industrial development.
	Policy 227: The County shall require that new developments are designed to maximize safety and security and minimize fire hazard risks to life and property.	✓The project will have a less than significant impact on law enforcement, fire, and emergency medical services. The project will have its own fire suppression procedures. See Section 8.8 for a detailed analysis. EAEC is consistent with this policy.
Water	Goal: *To provide an adequate, reliability efficient, safe, and cost-effective water supply to the residents, businesses, institutions, and agricultural uses in East County.*	
	Policy 240: The County shall support more efficient use of water through such means as conservation and recycling, and shall encourage the development of water recycling facilities to help meet the growing needs of East County.	✓The project would recycle water internally by using reverse osmosis and onsite treatment to implement maximum conservation and recycling. The project would use recycled water from MHCSD WWTP when it becomes available. See Section 8.14 for a detailed analysis. EAEC is consistent with this policy.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
	Policy 242: The County shall include water conservation measures as conditions of approval for subdivisions and other new development.	✓The project would recycle water internally by using reverse osmosis and onsite treatment to implement maximum conservation and recycling. The project would use recycled water from MHCSD WWTP when it becomes available. See Section 8.14 for a detailed analysis. EAEC is consistent with this policy.
Sewer	Goal: *To provide efficient and cost-effective sewer facilities and services.*	
	Policy 252: The County shall support Zone 7's policy which discourages commercial and industrial development using septic tanks.	✓The project would use vault toilets or septic systems to accommodate the up to 40 full-time employees because conveyance to an offsite treatment facility would be economically infeasible. However, there would be no commercial or industrial discharges to septic tanks. Section 8.14 provides a detailed analysis.
	Policy 253A: The County shall condition the approval of new development on verification that adequate wastewater treatment and export and/or reclamation capacity exists to serve the development.	✓The project would use vault toilets or septic systems to accommodate the up to 40 full-time employees because conveyance to an offsite treatment facility would be economically infeasible. The project is designed for zero discharge. Section 8.14 provides a detailed analysis.
Storm Drainage and Flood Control	Goal: *To provide efficient, cost-effective, and environmentally sound storm drainage and flood control facilities.*	
	Policy 258: The County shall regulate new development on a case-by-case basis to ensure that, when appropriate, project storm drainage facilities shall be designed so that peak rate flow of storm water from new development will not exceed the rate of runoff from the site in its undeveloped state.	✓Project will design storm drainage facilities so that peak flows will not exceed the current rate of runoff. Section 8.14 provides a detailed analysis. EAEC is consistent with this policy.
	Policy 260: The County shall encourage use of natural or nonstructural storm water drainage systems to preserve and enhance the natural features of a site.	✓The project would use an existing detention pond to store water, so that the existing natural stormwater drainage system will be adequate to convey flows. Section 8.14 provides a detailed analysis. EAEC is consistent with this policy.
Utilities	Goal: *To provide efficient and cost-effective utilities.*	

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
	Policy 264: The County shall require new developments to locate utility lines underground, whenever feasible.	✓The project has relatively short (0.5-mile) transmission lines. It is economically infeasible to locate short sections of high-voltage lines underground. Furthermore, the area is already heavily developed with overhead transmission lines entering the Tracy substation, and additional overhead lines are consistent with the existing conditions. EAEC is consistent with this policy.
Environmental Health: Noise	Goal: *To minimize East County residents' and workers' exposure to excessive noise.*	
	Policy 265: The County shall endeavor to maintain acceptable noise levels throughout East County.	✓Project will meet the existing County noise levels. See Section 8.5 for a complete analysis. EAEC is consistent with this policy.
	Policy 267: The County shall require noise studies as part of development review for projects located in areas exposed to high noise levels and in areas adjacent to existing residential or other sensitive land uses. Where noise studies show that noise levels in areas of existing housing will exceed "normally acceptable" standards (as defined by the *California Office of Noise Control Land Use Compatibility Guidelines*), major development projects shall contribute their prorated share to the cost of noise mitigation measures such as those described in Program 100.	✓A noise study was performed to identify areas of potential noise impacts. See Section 8.5 for a complete analysis. EAEC is consistent with this policy. If EAEC exceeds the normally acceptable standards, further mitigation measures will be implemented.
Environmental Health: Air Quality	Goal: *To ensure that air pollution levels do not threaten public health and safety, economic development, or future growth.*	
	Policy 271: The County shall require new development projects to include traffic and air pollutant reduction measures to help attain air quality standards. For non-residential projects, these measures could include Transportation Demand Management programs such as ridesharing and transit promotion; for residential projects, these measures could include site plan features to reduce traffic trip generation such as mixed used development and transit-oriented development.	✓The project includes extensive measures to reduce air pollution and has purchased ERCS, detailed in Section 8.1. The project will encourage the use of traffic reduction measures by its no more than 40 employees. EAEC is consistent with this policy.
	Policy 271A: The County shall require major projects of commercial or industrial nature to include bicycle storage facilities for employees and customers, shower/locker areas, and other facilities identified in the East County Bicycle Plan (*describe in Program 80*) for employees that commute using bicycles.	✓Because the project is located far from urban centers, it is not anticipated that any employees will choose to use bicycle transportation. However, adequate bicycle storage facilities would be available for any employee who chooses to use this mode of transportation. Project customers will not be present on site. EAEC is consistent with this policy.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
	Policy 275: The County shall require projects that generate high levels of air pollutants, such as manufacturing facilities, hazardous waste handling operations, and drive-through restaurants and banks, to incorporate air quality mitigations in their design.	✓The project is located away from residential areas. The project includes extensive measures to reduce air pollution, and has purchased ERCs, detailed in Sections 8.1 and 8.6. EAEC is consistent with this policy.
	Policy 276: The County shall review proposed projects for their potential to generate hazardous air pollutants.	✓The project includes extensive measures to reduce the generation of hazardous air pollutants, detailed in Sections 8.1 and 8.6, Public Health. EAEC is consistent with this policy.
	Policy 277: The County shall only approve new air pollution point sources such as manufacturing and extracting facilities when they are located away from residential areas and sensitive receptors [*see definition in Table 1]*.	✓The project is located away from industrial areas. The project includes extensive measures to reduce air pollution, detailed in Section 8.1. EAEC is consistent with this policy.
Environmental Health: Water Quality	Goal: *To protect and enhance surface and groundwater quality*.	
	Policy 282: The County shall protect surface and groundwater resources by: • preserving areas with prime percolation capabilities and minimizing placement of potential sources of pollution in such areas; • minimizing sedimentation and erosion through control of grading, quarrying, cutting of trees, removal of vegetation, placement of roads and bridges, use of off-road vehicles, and animal-related disturbance of the soil; • not allowing the development of septic systems, automobile dismantlers, waste disposal facilities, industries utilizing toxic chemicals, and other potentially polluting substances in creekside, reservoir, or high groundwater table areas when polluting substances could come in contact with flood waters, permanently or seasonally high groundwaters, flowing stream or creek waters, or reservoir waters; and, • avoiding establishment of excessive concentrations of septic systems over large land areas.	✓The project will protect surface and groundwater resources. Specific analysis and project descriptions are provided in Section 8.14. EAEC is consistent with this policy.
Seismic and Geologic Hazards	Goal: *To minimize the risks to lives and property due to seismic and geologic hazards.*	

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
	Policy 286: The County, prior to approving new development, shall evaluate the degree to which the development could result in loss of lives or property, both within the development and beyond its boundaries, in the event of a natural disaster.	✓The project is designed to withstand natural disasters, as described in Section 10.0. Specific information with respect to geologic and seismic hazards is provided in Section 8.15. EAEC is consistent with this policy.
	Policy 287: The County shall ensure that new major public facilities, including emergency response facilities (e.g., hospitals and fire stations), and water storage, wastewater treatment and communications facilities, are sited in areas of low geologic risk.	✓The project is designed to withstand natural disasters, as described in Section 10.0. Specific information with respect to geologic and seismic hazards is provided in Section 8.15. EAEC is consistent with this policy.
	Policy 291: The County shall require that buildings be designed and constructed to withstand groundshaking forces or a minor earthquake without damage, of a moderate earthquake without structural damage, and of a major earthquake without collapse of the structure. The County shall require that critical facilities and structures (e.g., hospitals, emergency operations centers) be designed and constructed to remain standing and functional following an earthquake.	✓The project is designed to withstand natural disasters, as described in Section 10.0. Specific information with respect to geologic and seismic hazards is provided in Section 8.15. EAEC is consistent with this policy.
Flood Hazards	Goal: *To minimize the risks to lives and property due to flood hazards.*	
	Policy 292: The County shall require new residential, public, commercial, and industrial development to have protection from a 100-year flood.	✓The project is located outside the 100-year flood zone. Additional analysis is provided in Section 8.14. EAEC is consistent with this policy.
Contra Costa General Plan		
	Policy 3-86: Many of the specific policy statements of this plan support the concept of allowing for multiple uses, compatible with the predominantly agricultural watershed and public purposes of this area. The policies stress the need to preserve designated agricultural lands for agricultural use, and also to allow certain other uses in the area, such as wind energy farms, mineral extraction, and reservoirs.	✓The project supports the policy of multiple, compatible uses in agricultural areas. Water and gas lines will be installed underground and will not interfere with agricultural uses. EAEC is consistent with this policy.
	Policy 3-87: The Southeast County area is almost exclusively planned for agricultural, watershed, or public purposes. New land uses in this plan area should be limited to those which are compatible to the primary agricultural and watershed purposes of the area (farming, ranching, poultry raising, animal breeding, etc.). and consistent with the multiple use philosophy enumerated by this plan. Subject to specific project review and the policies listed in the plan, uses including mineral resource quarrying, oil and gas wells, pipeline, and transmission lines are generally consistent with planned agricultural areas.	✓The project is compatible with this policy. Water and gas lines are compatible with agricultural uses and pipelines. EAEC is consistent with this policy.

TABLE 8.4-6
EAEC Land Use Consistency with Applicable Plans and Policies

Element	Goal/Policy	Consistency
	Policy 3-88: Public agencies are in the process of acquiring substantial portions of the planning area to serve the needs of the growing population of the East Bay. Two major public works projects include the East Contra Costa County Airport and the Los Vaqueros Reservoir.	✓ The project is compatible with this policy. The project is not anticipated to have a significant adverse impact to the implementation of these two public works projects.
San Joaquin General Plan		
	The policies supporting industrial development divide the development into limited and general industrial uses that must comply with certain siting, setback, and space requirements, in addition to service to infrastructure.	✓ The project will be compatible with applicable siting and setback requirements for this land use designation. The project is near service to infrastructure, such as the MHCSD WWTP.
	The policies supporting industrial development from incompatible uses include grouping the uses to avoid conflict, and protection from encroachment by other land uses that would diminish the supply of available land, except in limited circumstances where limited commercial uses are desired.	✓ The project is compatible with this policy and supports the aggregation of compatible infrastructure uses. The linear project facility will be sited in association with the MHCSD WWTP.
	The policies supporting the agricultural-urban reserve land use designation include that operational characteristics of the use shall not have a detrimental impact on the existing or potential use or management of the surrounding properties and that the use shall not require a significant investment in facilities or permanent structures which are not compatible with the future urban development.	✓ The project is compatible with this policy because the linear project facility in San Joaquin county would not involve aboveground structures incompatible with future urban development.

Sources: East County AreaPlan (1994), “Measure D,” Contra Costa General Plan (1996), San Joaquin General Plan (1992).

8.4.7 References

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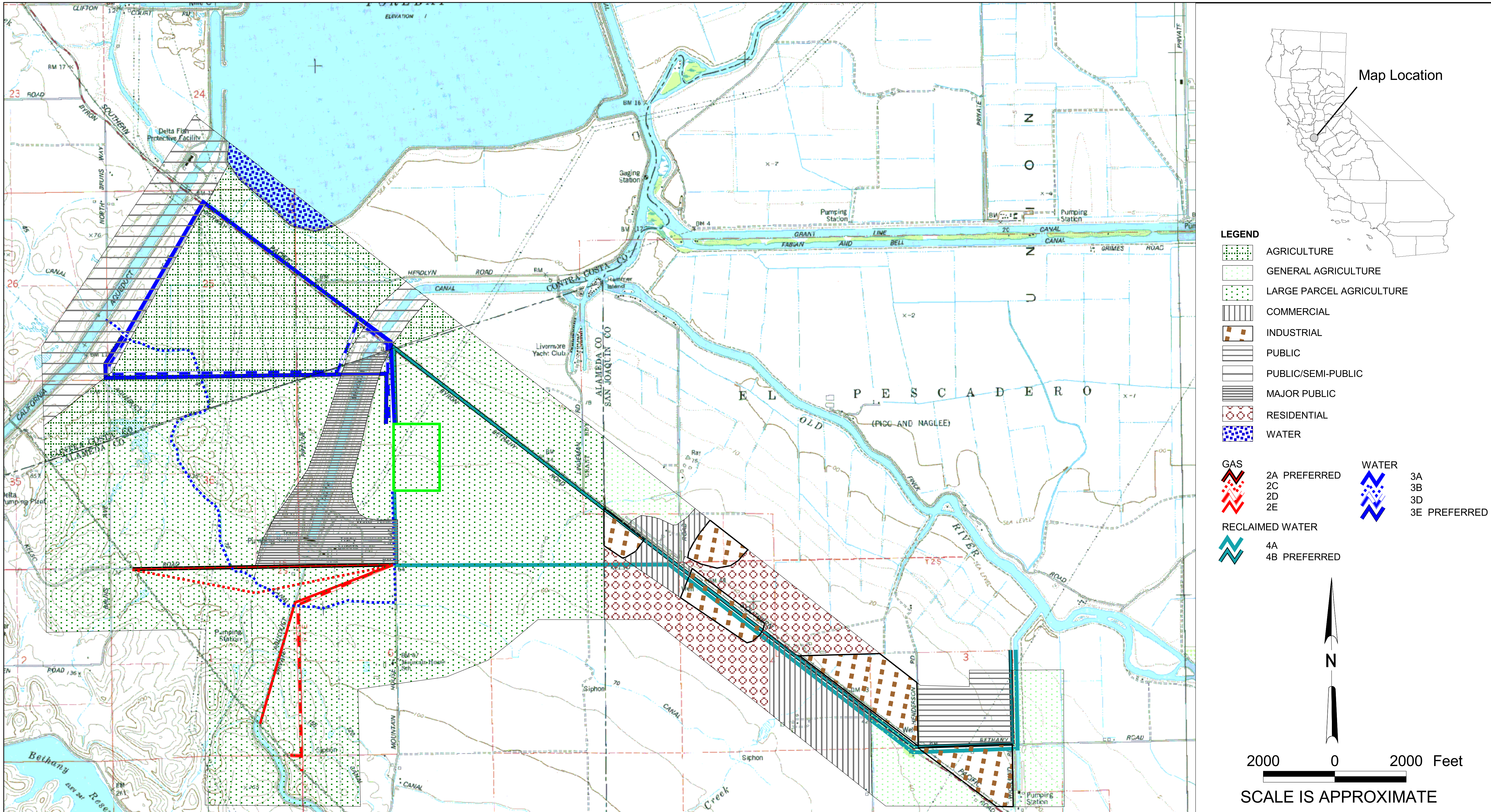

Sources: East Alameda County, San Joaquin County, and Contra Costa County General Plans

FIGURE 8.4-1
GENERAL LAND USE DESIGNATIONS FOR PROJECT AND VICINTIY

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

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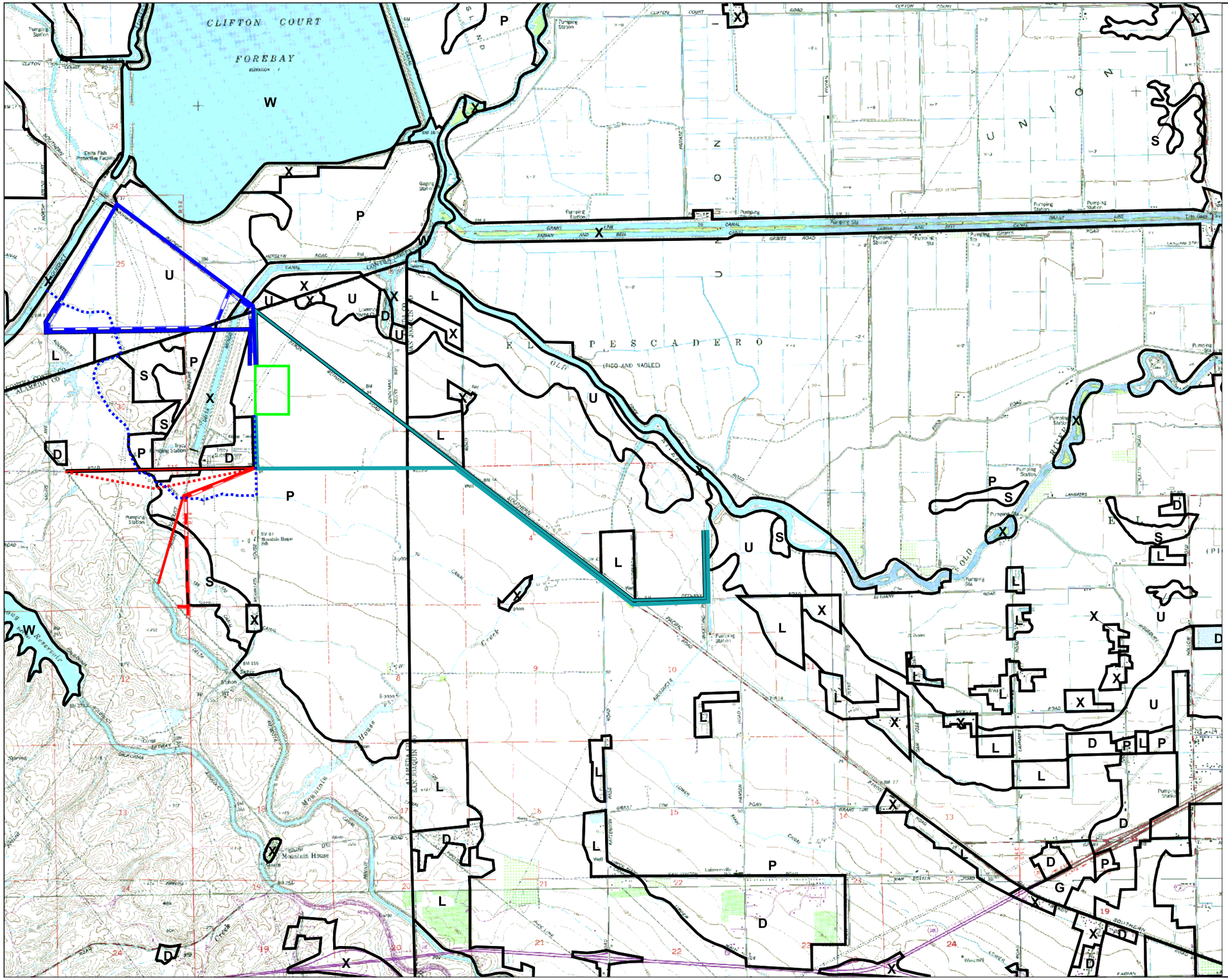

FIGURE 8.4-2
PROJECT AREA AGRICULTURE
APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

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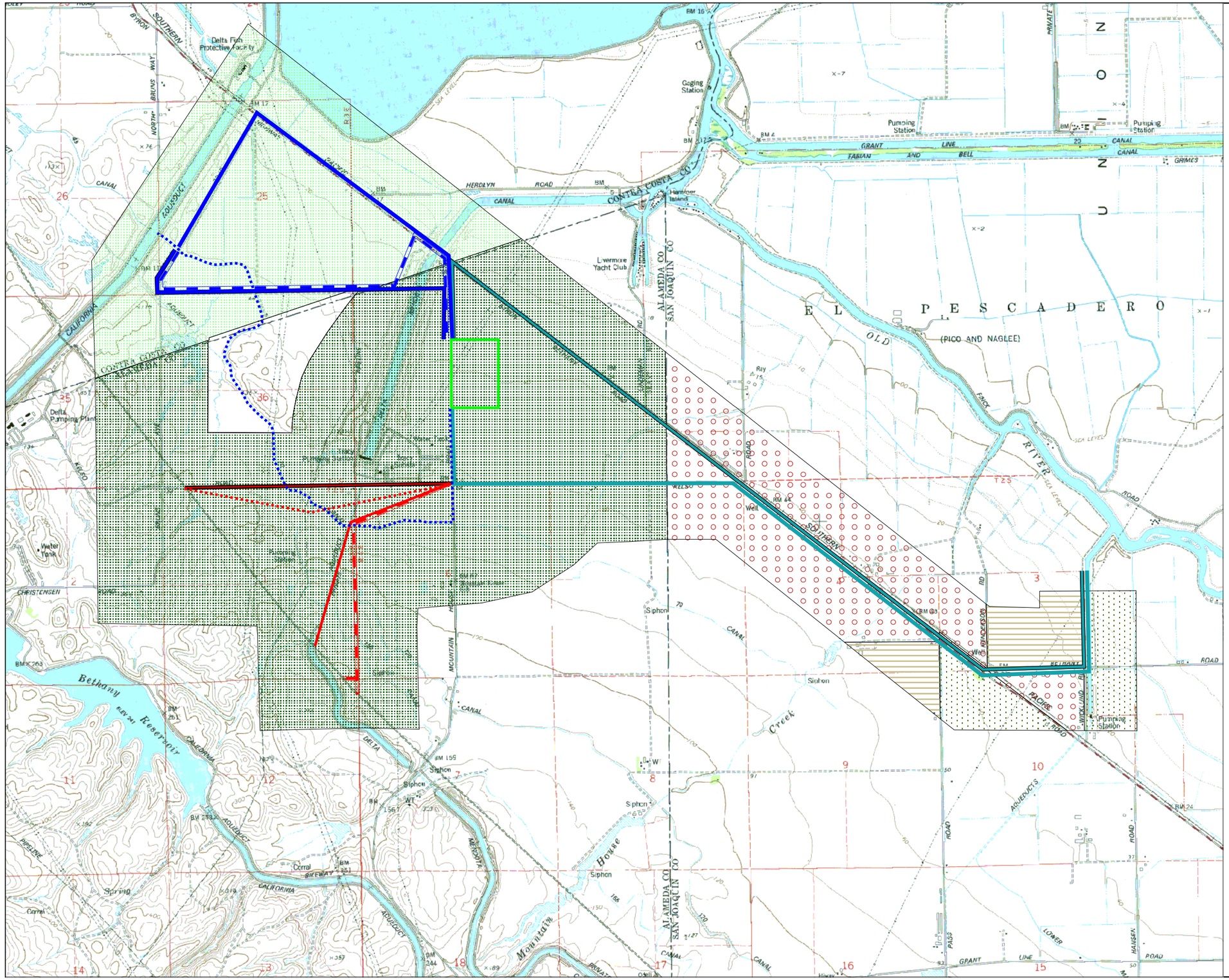

Sources: East Alameda County, San Joaquin County, and Contra Costa County Zoning Ordinances

FIGURE 8.4-3
ZONING DESIGNATIONS FOR PROJECT AND VICINITY

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

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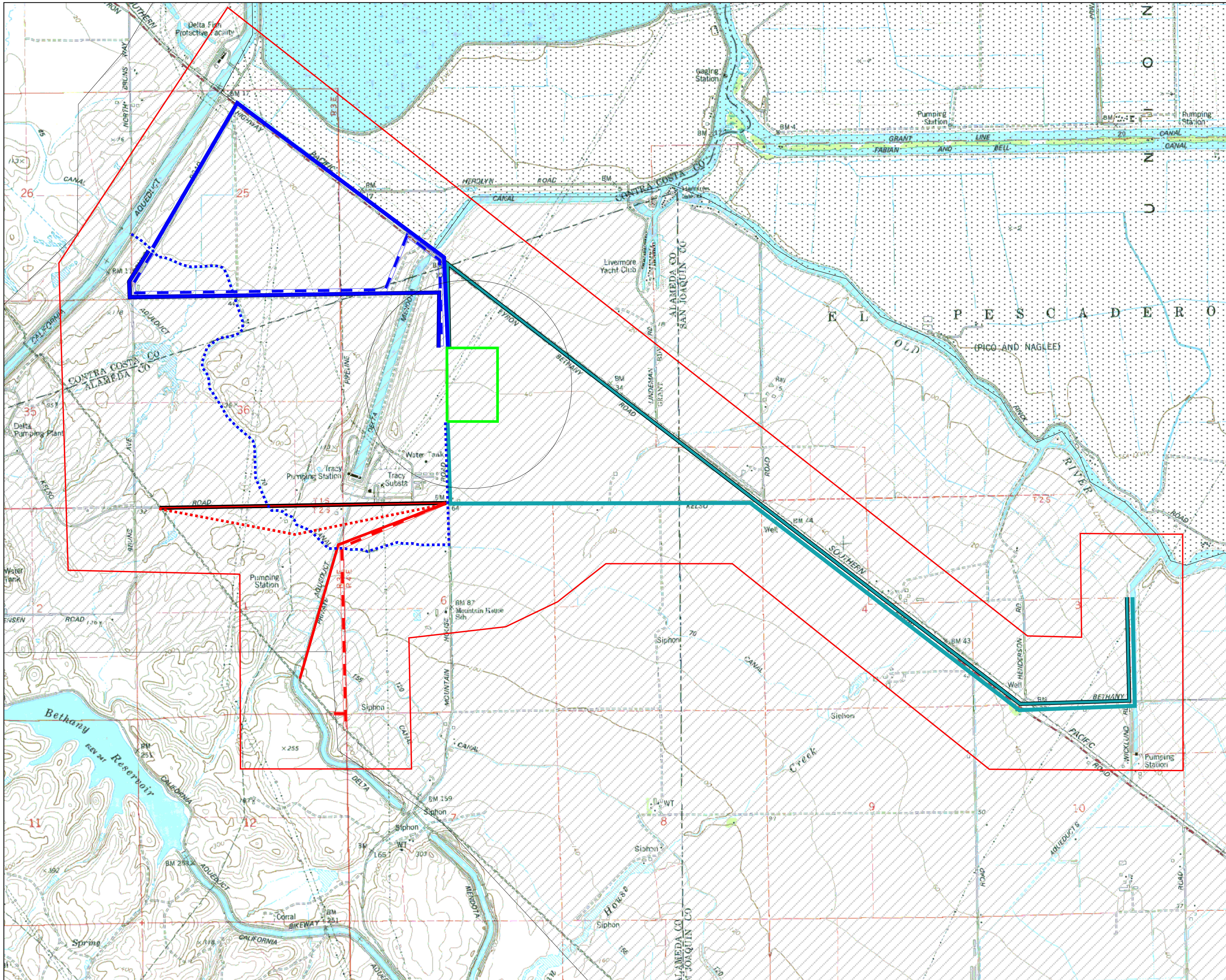

FIGURE 8.4-4
DELTA PROTECTION COMMISSION JURISDICTION

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

8.5 Noise

This section presents an assessment of potential noise effects related to construction and operation of the proposed EAEC. Section 8.5.1 discusses the fundamentals of acoustics. Section 8.5.2 summarizes existing conditions at the EAEC site, measured at the nearest sensitive receptor location. Section 8.5.3 presents the environmental consequences of impacts during construction and operation. An essential part of this assessment is a comparison of expected noise levels with acceptable noise levels presented in applicable LORS. The LORS are presented in Section 8.5.4. The permits and permitting schedule are discussed in Section 8.5.5. The involved agencies and agency contacts are presented in Section 8.5.6. Section 8.5.7 lists the references used in preparation of this section.

The project site is located in Alameda County and there are nearby noise-sensitive areas in Alameda, Contra Costa, and San Joaquin counties. Therefore, noise regulations of all three counties are addressed, as well as the CEC threshold standard.

Generally, the controlling criterion in the design of the noise control features of the project is the minimum, or most stringent, noise level required by any of the applicable LORS. The existing ambient noise levels are used as the baseline against which project noise impacts are assessed. The remaining portions of this section present the fundamentals of acoustics, a description of the affected environment, the project impacts from both construction and operation, proposed mitigation measures to reduce potential impacts to below significance, and an analysis of the project's compliance with the applicable LORS.

8.5.1 Fundamentals of Acoustics

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. In this section, some statistical noise levels are stated in terms of dBA. Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some of the noise in the low and high frequency ranges that the ear does not detect well. The A-weighted scale is used in most ordinances and standards. The equivalent sound pressure level (L_{eq}) is defined as the average noise level, on an energy basis, for a stated period of time (e.g., hourly). In practice, the level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighted curve. The sound level meter also performs the calculations required to determine the L_{eq} for the measurement period. Other measurements are used to give insight into the noise level distribution over the measurement period. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

Technical noise terms used in this section are summarized in Table 8.5-1.

TABLE 8.5-1
Definitions of Acoustical Terms

Term	Definitions
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound pressure, which is 20 micropascals (20 micronewtons per square meter).
A-Weighted Sound Level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent Noise Level (L_{eq})	The average A-weighted noise level during the measurement period.
Percentile Noise Level (L_n)	The noise level exceeded during n % of the measurement period, where n is a number between 0 and 100 (e.g., L_{90})
Community Noise Equivalent Level (CNEL)	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels from 7:00 p.m. to 10:00 p.m. and after addition of 10 decibels to sound levels between 10:00 p.m. and 7:00 a.m.
Day-Night Noise Level (L_{dn} or DNL)	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels from 10:00 p.m. to 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

In determining the daily level of environmental noise, the difference in response of people to daytime and nighttime noise exposure must be accounted for. During the nighttime, exterior background noise levels are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes more noticeable. Further, most people sleep at night and are sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, the Community Noise Equivalent Level (CNEL) was developed. CNEL is a noise index that accounts for the greater annoyance caused by noise during the evening and nighttime hours. CNEL values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period. Certain penalty factors are added to each evening and nighttime hourly L_{eq}, before the 24-hour CNEL is calculated. These penalties reflect the increased sensitivity to noise during evening and nighttime hours.

The daytime, evening, and nighttime periods and their associated noise penalty factors are as follows:

- Daytime: 7 a.m. - 7 p.m. No penalty
- Evening: 7 p.m. - 10 p.m. 4.8-dBA penalty
- Nighttime: 10 p.m. - 7 a.m. 10-dBA penalty

The Day-Night Sound Level (DNL or L_{dn}) differs from the CNEL in that it does not penalize the evening hours.

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction
- Interference with activities such as speech, sleep, learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of standard is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it to the existing or "ambient" environment to which that person has adapted. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the listeners.

With regard to increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this section:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside the laboratory, a 3-dBA change is considered a just-perceptible difference.
- A change in noise level of at least 5 dBA is required before any noticeable change in community response would be expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse community response.

Table 8.5-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels (Beranek, 1988).

TABLE 8.5-2
Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Shotgun	140	Carrier Flight Deck	
Civil Defense Siren (100 ft)	130		
Jet Takeoff (200 ft)	120		Threshold of Pain
Loud Rock Music	110	Rock Music Concert	
Pile Driver (50 ft)	100		Very Loud
Ambulance Siren (100 ft)			
	90	Boiler Room	
Freight Cars (50 ft)		Printing Press Plant	
Pneumatic Drill (50 ft)	80	Noisy Restaurant	
Freeway (100 ft)			
Busy Traffic; Hair Dryer	70		Moderately Loud
Normal Conversation (5 ft)	60	Data Processing Center	
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft); Rainfall	50	Private Business Office	
Large Transformer (200 ft)			
Bird Calls (distant)	40	Average Living Room Library	Quiet
Soft Whisper (5 ft); Rustling Leaves	30	Quiet Bedroom	
	20	Recording Studio	
Normal Breathing	10		
	0		Threshold of Hearing

8.5.2 Affected Environment

The EAEC is proposed to be sited in an existing agricultural plot. The project site is located on Mountain House Road south of Byron Bethany Road, near the northeast corner of Alameda County. The site is about 2,500 feet south of the Contra Costa County line and about 4,500 feet west of the San Joaquin County line. Noise-sensitive land uses closest to the site are primarily isolated residential buildings located in farm lands surrounding the site. The closest homes are located about 0.5 to 0.6 mile to the southeast and northeast of the site. Other noise-sensitive locations include a few homes and a school located south of Kelso Road, residential structures at the Livermore Yacht Club located to the northeast, and scattered residential uses about one mile southwest and northwest of the site.

Sources of environmental noise in the vicinity of the site include vehicular traffic movements on Byron Bethany Road and other local roadways, occasional general aviation aircraft activity, and other distant aircraft overflights.

Existing noise levels were measured at four locations in the project vicinity. The noise monitoring locations are designated as Sites 1 through 4 on Figure 8.5-1 (located at the back of this section). The measurements consisted of continuous overnight noise monitoring, consisting of 10-minute intervals, at Sites 1 and 2, and short-term (10-minute) samples at Sites 3 and 4. Following are brief descriptions of each monitoring location:

- **Site 1**—This monitoring location is near the closest residence southeast of the project site, located on Kelso Road (Franco Property).

- **Site 2**—This site is located west of Lindeman Road next to the nearest residential structures northeast of the project site.
- **Site 3**—This site is on Mountain House Road, next to the first residence south of Kelso Road. This location is also representative of the school farther south on Mountain House Road.
- **Site 4**—This site is adjacent to the residential structures at the Livermore Yacht Club located northeast of the project site.

8.5.2.1 Noise Survey Methodology

Continuous noise level measurements at Sites 1 and 2 were conducted using two Bruel & Kjaer (B&K) Type 2236 integrating sound level meters equipped with B&K Type 4188 0.5-inch microphones. To ensure the accuracy of the measurements, the sound level meters were calibrated prior to use with a B&K Type 4231 acoustical calibrator. The short-term sound level measurements were conducted using a B&K Type 2231 equipped with a B&K 4155 0.5-inch microphone. The calibrator used with this unit was also a B&K Type 4231. All equipment used in the survey complies with the requirements of the American National Standards Institute (ANSI) and the International Electrotechnical Commission (IEC) for Type 1 precision sound level measurement instrumentation. In all cases, the microphones were placed at a position of about 5 feet above local ground elevation using tripods.

Continuous noise levels at both Sites 1 and 2 were recorded for periods of about 23 hours. Noise monitoring at Site 1 began at 2:00 p.m. on January 2, 2001 and ended at 1:00 p.m. on January 3, 2001. At Site 2, the noise monitoring was performed between 2:50 p.m. on January 22, 2001 and 1:20 p.m. on January 23, 2001. Noise level data were recorded in terms of hourly L_{eq}, L_{10}, and L_{90}. The existing CNEL at these locations was calculated directly from the hourly L_{eq} data. Daytime and nighttime 10-minute measurements were taken at each of the remaining monitoring locations during the monitoring period. These spot measurements were taken in terms of L_{eq}, L_{10}, L_{50}, and L_{90} at each location during the early and late morning periods of January 23, 2001. Weather conditions during the noise measurement periods generally consisted of overcast skies, cool temperatures (about 45° to 50° F), and a slight northwesterly breeze. On the morning of January 23, clouds increased gradually, ending in precipitation by early afternoon. Consequently, the continuous noise monitoring had to be stopped prior to the customary 25-hour monitoring durations, since the rain would skew the results.

8.5.2.2 Noise Survey Results

Noise levels recorded at Site 1 represent existing conditions at the nearest noise-sensitive receptors to the site. As expected, nighttime and evening ambient noise levels were lower than daytime levels. Assuming a 24th hour L_{eq} equal to that measured for the 23rd hour, the projected CNEL at Site 1 for the noise monitoring period was 57 dBA. At Site 2, the calculated CNEL was also projected to be 57 dBA. These values account for all noise sources including nearby traffic.

At Site 1, the lowest hourly L_{90} occurred between 2:00 and 3:00 a.m. on January 23, 2001 at 29 dBA. Measured hourly L_{90} values during the noise monitoring period ranged from 29 dBA to 40 dBA. For the entire monitoring period, the average measured L_{eq} and L_{90} at Site 1 were

53 and 35 dBA, respectively. At Site 2, the average measured L_{eq} and L_{90} values were 51 and 45 dBA, respectively. During quiet nighttime hours, before increases in morning traffic volumes on local roadways occur (between 10 p.m. and 5 a.m.), the calculated average L_{90} at Sites 1 and 2 were 31 and 35 dBA, respectively. The average L_{90} values are used in this analysis due to the predominant influence of traffic noise at the two continuous monitoring locations (Sites 1 and 2). The traffic noise can be seen as sharp spikes in the noise monitoring results.

The results of the continuous and intermittent noise monitoring are summarized in Table 8.5-3. The detailed noise monitoring data from Sites 1 and 2 are presented in Appendix 8.5.

TABLE 8.5-3
Summary of Noise Level Measurement Results

Date	Start Time	End Time	Leq	L10	L50	L90	Noise Source(s)
Site 1: Franco Residence							
1/22/01 to 1/23/01	2:00 p.m.	1:00 p.m.	53	46	---	35	Distant traffic noise
Site 2: Residence on Lindeman Road							
1/22/01 to 1/23/01	2:50 p.m.	1:20 p.m.	51	54	---	45	Distant traffic noise
Site 3: Mountain House Road, just south of Kelso Road							
1/23/01	1:52 AM	2:02 AM	42	47	35	32	Distant aircraft takeoff during first sample; local and distant traffic; distant aircraft
1/23/01	2:05 AM	2:15 AM	32	34	31	30	
1/23/01	10:18 AM	10:28 AM	66	67	48	43	
Site 4: Lindeman Road, adjacent to homes at the Livermore Yacht Club							
1/23/01	2:30 AM	2:40 AM	36	39	35	33	Vehicular traffic; distant coyotes howling; roosters; geese on nearby water; distant aircraft
1/23/01	2:41 AM	2:51 AM	40	44	37	32	
1/23/01	10:45 AM	10:55 AM	58	54	49	45	

Source: CH2M HILL

8.5.3 Environmental Consequences

Noise will be produced at the site during both the construction and operational phases of the project. Potential noise impacts from both activities are assessed in this section.

8.5.3.1 Applicable Laws, Ordinances, Regulations, and Standards

A detailed description of the applicable LORS can be found in Section 8.5.4. The following is a brief summary of the guidelines that were used to assess the potential impacts.

In its Community Noise Ordinance, the County of Alameda has set exterior noise standards to regulate noise generated within unincorporated areas of the county. The lowest County noise level limit applicable to noise-sensitive uses, including residences, is a nighttime (10 p.m. to 7 a.m.) limit of 45 dBA. Additionally, the Noise Element of the Alameda County General Plan has established a noise level limit of 60 dBA CNEL as a level not to be exceeded at exterior locations of residential land uses. The Alameda Building Code has adopted an interior noise level standard of 45 dB CNEL inside residential structures. The County ordinance requires that any residential structure exposed to an exterior CNEL of

60 dBA or above has to be designed to limit intruding noise to the prescribed level of 45 dB CNEL.

The existing average L_{90} during quiet nighttime hours, before traffic volume increases in the morning, is considered representative of the existing background noise level at the sensitive receptors. This is a conservative approach in view of the predominance of traffic noise in the local environment since the L_{90} tends to filter out intermittent, irregular noise from nearby roadways.

The California Energy Commission has historically considered a 5-dBA increase over the nighttime L_{90} at the nearest sensitive receptor as a standard over which additional noise analysis is required to determine whether any significant adverse impacts occur. An increase of less than 5-dBA or less over the nighttime L_{90} at the nearest sensitive receptor would generally be presumed to result in no significant impacts.

The 5-dBA threshold of significance is especially relevant in cases where the noise environment is already impacted, and any incremental noise level increase would result in an adverse effect. In some such instances, the noise environment already exceeds the standards set by local LORS, so that a new project cannot comply with the local LORS; in these cases a 5-dBA sound level increase provides a guideline for acceptable impacts where local LORS are already exceeded. For project sites that are located away from population centers and transportation corridors, a 5-dBA sound level increase would likely occur over a large area given the existing quiet noise environment. However, an increase of more than 5-dBA in noise levels in a very quiet environment may not necessarily result in a significant adverse effect. This is because the overall noise levels of the background and project noise levels could still be low enough to not cause much annoyance. In such a case, the most restrictive absolute noise levels as established by the LORS would provide an appropriate means of determining impact significance.

As mentioned previously, the Alameda County Noise Element of the General Plan contains provisions and policies that attempt to minimize noise impacts to the community. The County's Noise Element vaguely mentions a noise exposure of 60 dBA CNEL as the noise level at which noise insulation features are generally required.

The Alameda County Building Code has adopted an interior noise level standard of 45 dB CNEL inside residential structures. The County ordinance requires that any residential structure exposed to an exterior CNEL of 60 dBA or above has to be designed to limit intruding noise to the prescribed level of 45 dB CNEL.

In its Community Noise Ordinance, the County of Alameda has set exterior noise standards to regulate noise generated within unincorporated areas of the county (County of Alameda, 1988). The Contra Costa County Noise Element of the General Plan establishes noise level standards applicable to exterior and interior residential uses. The County's exterior noise standard is a DNL of 60 dBA within outdoor activity areas of homes and its interior noise level standard is 45 dBA DNL within inhabited rooms of homes.

Chapter 9-1025 of the San Joaquin County Zoning Ordinance establishes performance standards to mitigate environmental impacts of commercial and industrial uses.

8.5.3.2 Construction Impacts

Alameda County does not set any limits on the level of noise from construction, but allows construction only between the hours of 7:00 a.m. to 7:00 p.m. on weekdays, and 9:00 a.m. to 7:00 p.m. on weekends.

Project noise levels will vary during the construction period, depending upon the construction phase. Construction at the site would include grading and preparing the site, digging ditches to lay water and gas pipes leading to the site, pouring concrete, erecting steel, installing the power equipment, and performing site cleanup.

Both the USEPA Office of Noise Abatement and Control and the Empire State Electric Energy Research Company have extensively studied noise from individual pieces of construction equipment as well as from construction sites of power plants and other types of facilities (USEPA 1971; Barnes et al., 1976). Because specific information on types, quantities, and operating schedules of construction equipment is not available at this stage in project development, information from these documents is used. Use of these data, which are between 21 and 26 years old, is conservative because construction equipment is generally quieter now than 20 years ago.

The loudest equipment types generally operating at a site during each phase of construction are presented in Table 8.5-4. The composite average or equivalent site noise level, representing noise from all equipment, is also presented in the table for each phase.

TABLE 8.5-4
Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level at 50 feet (dBA)	Composite Site Noise Level at 50 feet (dBA)
Site Clearing and Excavation	Dump Truck Backhoe	91 85	89
Pouring Concrete	Truck Concrete Mixer	91 85	78
Erecting Steel	Derrick Crane Jack Hammer	88 88	87
Mechanical	Derrick Crane Pneumatic Tools	88 86	87
Cleanup	Rock Drill Truck	98 91	89

Source: USEPA, 1971; Barnes et al., 1976.

Average or equivalent construction noise levels projected to the nearest residences from the site are presented in Table 8.5-5. These results are conservative because the only attenuating mechanism considered was divergence of the sound waves. Average noise levels during the loudest construction activities are projected to be between 42 dBA and 54 dBA at receptors located at a distance of just over one-half mile from the site. Measured noise levels (hourly L_{eq}) between the hours of 7:00 a.m. and 7:00 p.m. at Site 1 range from 54 to 60 dBA. Therefore, construction noise would occasionally be audible at the nearest residences but would blend with noise from other background sources and be short in duration and intermittent in nature.

TABLE 8.5-5
Average Construction Noise Levels at Various Receptors (dBA)

Construction Phase	Site 1 Nearest Home Southeast of the Site (2,700 feet)	Site 2 Nearest Home Northeast of the Site (3,200 feet)
Site Clearing and Excavation	54	53
Pouring Concrete	43	42
Erecting Steel	52	51
Mechanical	52	51
Cleanup	54	53

8.5.3.3 Operational Impacts

The EAEC will be designed to comply with the local and CEC LORS summarized in Section 8.5.4; specifically, the noise standards set forth by Alameda County in furtherance of its noise policy.

Two receptor sites have been evaluated with respect to operational noise impacts:

Site 1. Nearest residence southeast of the site, about one-half mile away

Site 2. Nearest house northeast of the site, about 3,200 feet away

Since the L_{90} tends to filter out intermittent, irregular noise from transient sources of environmental noise such as traffic and aircraft, it is considered to represent the predominant background noise level. In the EAEC project area, the existing average L_{90} during quiet nighttime hours (10:00 p.m. to 5:00 a.m.), before traffic volume increases in the morning, is considered representative of the existing background noise level at the sensitive receptors during quiet periods.

For the nearest receptor, Site 1, the average hourly L_{90} during quiet nighttime hours (10 p.m. to 5 a.m.) was found to be 31 dBA, based on continuous 24-hour monitoring. The average nighttime L_{90} value is being used to represent the existing background noise level during the quietest periods due to vehicle traffic impacting the nighttime noise background. For a steady noise source, such as the proposed power equipment, compliance with the County's 60 dBA CNEL standard would require meeting a continuous noise level of 53 dBA. Alameda County's nighttime noise level standard is a level of 45 dBA at residential locations.

The average nighttime L_{90} between 10 p.m. and 5 a.m. at Site 2 was found to be 35 dBA, based on continuous 24-hour monitoring. At Sites 3 and 4, the lowest measured nighttime L_{90} spot-check values were 30 and 32 dBA, respectively. These levels are similar to the nighttime average L_{90} at Site 1. Therefore, Sites 1 and 2 are considered to be representative of the noise environment in the project vicinity.

8.5.3.4 Noise Analysis Methodology

The far-field, A-weighted noise emissions of the proposed plant have been evaluated with a spreadsheet-based noise model. The model calculates the far-field sound pressure level of each source at a point of interest and then totals these values to establish the overall plant noise level. To do this, the model is provided with an initial sound power level for each individual piece of equipment in the plant that produces a significant amount of noise.

The key to any model's accuracy is the accuracy of the initial sound power levels used to represent each source. All inputs to the current model have been derived exclusively from first-hand field measurements of similar or identical equipment in actual operation at numerous combined-cycle facilities. In general, the initial baseline sound power levels used are representative of the normal in situ performance of standard equipment; i.e., equipment that has not been upgraded or specially improved to reduce noise. Only noise abatement measures that are always supplied as a part of the standard system are assumed to be present. Examples would be combustion turbine inlet silencers, auxiliary boiler fan inlet silencers, and turbine weather enclosures.

The source sound power levels and the modeling technique in general have been verified by comparing the predicted far-field levels of specific plants to direct measurements. In all cases, the analytical results have been found to yield plant noise levels that are equal to or, more commonly, slightly higher than the true performance.

The conversion from the sound power level of a given source to the sound pressure level it produces at what is normally a considerable distance away involves the consideration of a number of processes and phenomena. The noise reduction factors calculated or conservatively estimated in the model include distance loss, internal mutual shielding in the plant, equipment noise directivity, and other minor losses including ground absorption, air absorption, and "anomalous" attenuation. Losses from structures or terrain beyond the site boundaries are considered only when it is obvious they would have some effect on noise levels beyond and when the heights and locations are well understood.

The sound propagation factors used in the model have been adopted from the *Electric Power Plant Environmental Noise Guide* published by the Edison Electric Institute (Miller et al., 1978), and ISO 9613-2 *Acoustics - Sound Attenuation During Propagation Outdoors*. Safety factors based on field experience have generally been added to the propagation loss values predicted in the above sources. In general, values for internal blockage between sources in the plant have been conservatively included.

It should also be noted that since pressurized systems requiring safety relief valves operate infrequently, their emissions are not included in the noise model. Transient noise from steam venting during normal startups may be temporarily discernible but at a distance of one mile or more the potential magnitude of such noise is unlikely to be sufficient to cause a legitimate disturbance – even assuming a relatively low background level.

Once a baseline analysis has been established, noise reductions are added, if required, in a second iteration to determine what each source level actually must be to satisfy the required far-field noise level at each receptor location. The base sound power level for each source less any required attenuation becomes the noise level that is specified and must be guaranteed by the equipment suppliers.

8.5.3.5 Predicted Noise Levels during Normal Operation

The noise emission contours from the EAEC plant at full load have been calculated and mapped over the project site and the surrounding areas as shown in Figure 8.5-1. The noise levels presented represent the anticipated maximum level from the plant with essentially all equipment operating.

A noise analysis was performed to predict operational noise emissions at nearby sensitive receptors. The background noise levels for locations A (Site 1) and B (Site 2) are 31 and 35 dBA, respectively were derived from the average L_{90} at each location. Average L_{90}, rather than lowest L_{90}, was used as a baseline noise level to account for periodic traffic noise that would otherwise not be reflected in the lowest L_{90}. The background noise level for all other receptors (33 dBA) represents the average of the background noise level used for locations A (Site 1) and B (Site 2).

As shown in Table 8.5-6, nighttime sound level increases at the nearest receptors would be in excess of 5-dBA. However, exterior noise levels at all receptors would be 45-dBA or less, which meets the most restrictive LORS. Additionally, since the greatest sound level differential occurs at night, the 12- to 20-dBA sound attenuation provided by ordinary residential construction would reduce interior sound levels to pre-project levels, resulting in no disturbance to occupants.

Table 8.5-7 summarizes the model results for the baseline conditions and compares them to plant design noise levels to meet the applicable local noise level limits at the nearest receptors. Figure 8.5-2 shows the locations of these receptors relative to the project site.

As presented above, the project will comply with not only the applicable Alameda County noise ordinances and General Plans, but also with the Contra Costa and San Joaquin County noise ordinances and General Plans. However, the applicant included noise attenuation measures in the plant design. These measures are presented below in Section 8.5.3.6.

8.5.3.6 Mitigation Measures

The following design measures were included in the project design to minimize the potential noise impacts from the project.

- Combustion turbines enclosed in an acoustical enclosure designed to limit near field noise levels to 85 dBA at 3 feet.
- Noise enclosure on steam turbine generator.
- Silencers on relief valve stacks. Total Enclosed Water/Air Cooled (TEWAC) motors on circulation water pumps to reduce motor noise.
- Design of major components to limit near field maximum noise levels to less than 90 dBA at 3 feet (or 85 dBA at 3 feet where available as a vendor standard).
- Location of power block in central portion of project site to maximize distance to nearest receptors.
- Location of cooling towers on north side of site, farthest from nearby receptors.
- Location of the brine concentrator compressor inside the wastewater treatment facility.

TABLE 8.5-6
Comparison of Baseline Plant Noise Levels to Existing Background and Applicable LORS (dBA)
at Nearest Noise-Sensitive Receptors during Base Load Operation

Receptor Location[a]	Baseline Plant		Background[b]	Overall (Plant + Background)	Increase in Ambient Noise (L_{90})	Alameda County[c]			
						Noise Ordinance		Noise Element of General Plan	
	Actual (L_{90})	CNEL	L_{90}	L_{90}		Steady State Limit	Plant Compared to Standard	CNEL	Plant Compared to Standard
A (Site 1)	45	52	31	45	+14	45	0	60	-8
B (Site 2)	42	49	35	43	+8	45	-2	60	-11
C (Site 3)	43	50	33	43	+10	45	-2	60	-10
D (Site 4)	38	45	33	39	+6	45	-6	60	-15
E	42	49	33	42	+9	45	-3	60	-11
F	40	47	33	41	+8	45	-4	60	-13
G	42	49	33	42	+9	45	-3	60	-11
H	36	43	33	37	+4	45	-8	60	-17
I	39	46	33	40	+7	45	-5	60	-14
J	36	43	33	37	+4	45	-8	60	-17
K	37	44	33	38	+5	45	-7	60	-16
L	34	41	33	35	+2	45	-10	60	-19
M	35	42	33	38	+5	45	-7	60	-18

[a]Receptor locations A through D are the same as monitoring Sites 1 through 4, respectively.

[b]Background noise levels at locations A and B represent average L_{90} measurements for the hours of 10:00 p.m. to 5:00 a.m., before traffic volume increases in the morning. At locations D and E, the L_{90} shown is the lower of two nighttime measured levels. At locations C through M, nighttime L_{90} was assumed to be an average of the average L_{90} data from Sites A and B measurement data.

[c]Alameda County has a noise ordinance that limits nighttime noise at noise-sensitive receptors to a steady level of 45 dBA and a general plan that includes a noise element with a Community Noise Equivalent Level (CNEL) limit of 60 dBA for exterior of homes.

TABLE 8.5-7
Comparison of Baseline Plant Noise Levels to the Applicable Alameda County Noise Ordinance (dBA)
Nearest Noise-Sensitive Receptors during Base Load Operation

Receptor	Baseline Plant		Alameda County		Contra Costa County		San Joaquin County
	Actual	CNEL	Noise Ordinance	General Plan (CNEL)	Outdoor Limit	Indoor Limit	Nighttime Maximum
A (Site 1.)	45	52	45	60	45	60	45
B (Site 2.)	42	49	45	60	45	60	45

Source: Baseline plant noise levels are provided by Hessler Associates, Inc

Although no significant noise impacts were identified based on the LORS, the applicant has offered to provide additional sound attenuation at receptors where post-project sound levels would exceed 5 dBA and residents complain of disturbance from increased noise due to the generating facility. The sound attenuation program would provide residents wishing to participate in the program with upgrades to their residences to reduce the noise levels. The specific upgrades for each participant would be specific to each participant of the sound attenuation program. However, the program could include some or all of the following upgrades to the participant's residences: replacement of single-pane windows with dual-pane windows; upgrade hollow-core exterior with solid-core doors; and provide additional sound insulation in walls. Based on actual post-project sound level readings, residents who are within an area that experiences noise level increases of 5 dBA or greater as a result of the project, would be eligible for the sound attenuation program. Residents could participate in the sound attenuation program by filing an affidavit with the project owner stating they are being disturbed by increased noise levels and wish to participate in the program.

8.5.3.7 Worker Exposure to Construction and Operational Noise

Worker exposure levels during construction of the EAEC will vary depending on the phase of the project and the proximity of the workers to the noise-generating activities. Hearing protection will be available for workers and visitors to use as needed throughout the duration of the construction period. A hearing protection plan, which complies with Cal-OSHA requirements, will be incorporated into the Health and Safety Plan.

During operations, in addition to far-field noise limits, nearly all components will also be specified with near-field maximum noise levels of 90 dBA at 3 feet (or 85 dBA at 3 feet where available as a vendor standard). Since there are no permanent or semi-permanent workstations located near any piece of noisy plant equipment, no worker's time-weighted average exposure to noise should approach the level allowable under OSHA guidelines. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA, such as inside acoustical enclosures. Outdoor levels throughout the plant will typically range from 90 dBA near certain equipment to roughly 65 dBA in areas more distant from any major noise source.

8.5.3.8 Transmission Line and Switchyard Noise Levels

The electrical output of the plant will be connected to the existing 230-kV transmission line about 2,600 feet south of the site. The project will not require the construction of new transmission line near residential properties. Consequently, no impact is expected from

either the construction or the operation of the electrical transmission line. Also, the low-frequency hum emitted by the switchyard will be inaudible at all of the receptors because of the relatively large intervening distances.

8.5.4 Applicable Laws, Ordinances, Regulations and Standards

The following are the applicable LORS that apply to noise generated by the project.

8.5.4.1 Federal

The federal government has no standards or regulations applicable to offsite noise levels from the project. However, guidelines are available from the USEPA (1974) to assist state and local government entities in developing state and local LORS for noise. The recommended level for protection against activity interference and annoyance at rural residences is a DNL of 55 dBA.

Onsite noise levels are regulated, in a sense, through OSHA. The noise exposure level of workers is regulated at 90 dBA, over an 8-hour work shift to protect their hearing (29 CFR 1910.95). Onsite noise levels will generally be in the 70- to 85-dBA range. Areas above 85 dBA will be posted as high noise level areas and hearing protection will be required. The power plant will implement a hearing conservation program for applicable employees and maintain exposure levels below 90 dBA.

8.5.4.2 State

Two state laws apply to the project that address occupational noise exposure and vehicle noise. The California Department of Industrial Relations, Division of Occupational Safety and Health enforces Cal-OSHA regulations, which are the same as the federal OSHA regulations described above. The regulations are contained in 8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Sections 5095, et seq.

Noise limits for highway vehicles are regulated under the California Vehicle Code, Sections 23130 and 23130.5. The limits are enforceable on the highways by the California Highway Patrol and the County Sheriff's Office.

8.5.4.3 Local

The California State Planning Law (California Government Code Section 65302) requires that all cities, counties, and entities (such as multi-city port authorities) prepare and adopt a General Plan to guide community change.

Alameda County. The Alameda County Noise Element of the General Plan contains provisions and policies that attempt to minimize noise impacts to the community. The County's Noise Element vaguely mentions a noise exposure of 60-dBA CNEL as the noise level at which noise insulation features are generally required.

The Alameda Building Code has adopted an interior noise level standard of 45-dBA CNEL inside residential structures. The County ordinance requires that any residential structure exposed to an exterior CNEL of 60-dBA or above has to be designed to limit intruding noise to the prescribed level of 45-dB CNEL. The lowest County noise level limit applicable to noise sensitive uses, including residences, is a nighttime (10:00 p.m. to 7:00 a.m.) limit of 45-dBA.

In its Community Noise Ordinance, the County of Alameda has set exterior noise standards to regulate noise generated within unincorporated areas of the county (County of Alameda, 1988).

The standards, shown in Table 8.5-7, correlate types of land use with minutes of exposure to various dBA levels, by time of day. Each of the county noise level standards is reduced by 5 dBA when applied to simple tone noises, noises consisting primarily of speech or music, or recurring impulsive noises that are generated within areas of county jurisdiction.

Noise sources associated with construction are exempted from the Alameda County noise standards provided that construction activities do not take place before 7 a.m. or after 7 p.m. Monday through Friday, or before 8 a.m. or after 5 p.m. on Saturday or Sunday.

Alameda County East County Area Plan Policies. Policy 265 requires the County to endeavor to maintain acceptable noise levels throughout the eastern part of the county. The EAEC project is consistent with this policy as the project complies with the County noise ordinances.

Policy 266 requires the County to limit or mitigate new noise-sensitive developments in areas exposed to project noise levels exceeding 60 dB. The project is consistent with this policy as the maximum expected noise impacts will not exceed 60 dB off the project site, as shown by Figure 8.5-1.

Policy 267 requires new developments sited in areas exposed to high noise levels or in areas adjacent to existing residential/sensitive land uses to conduct a noise study as part of the site development review. The EAEC project complies with this policy by providing this above-mentioned noise analysis. Furthermore, the project is sited in a rural, agricultural area with few sensitive land uses and scattered residences.

Contra Costa County. Contra Costa County Noise Element of the General Plan establishes noise level standards applicable to exterior and interior residential uses. The County's exterior noise standard is a DNL of 60 dBA within outdoor activity areas of homes and its interior noise level standard is 45 dBA DNL within inhabited rooms of homes. The operational noise levels at the Contra Costa County line are expected to be less than 45 dBA.

San Joaquin County. Chapter 9-1025 of the San Joaquin County Zoning Ordinance establishes performance standards to mitigate environmental impacts of commercial and industrial uses. Section 9 of this chapter defines the County noise and land use compatibility standards. The operational noise levels at the San Joaquin County line are expected to be between 35 and 40 dBA. These noise level standards are identical to those applied by Alameda County, as shown by Table 8.5-8.

TABLE 8.5-8
County of Alameda Noise Standards for Noise-Sensitive and Commercial Land Uses for EAEC Noise

Cumulative Number of Minutes in any 1-Hour Time Period	Noise Level Standard (dBA)			
	7 a.m. to 10 p.m.		10 p.m. to 7 a.m.	
	Noise Sensitive[a]	Commercial	Noise Sensitive	Commercial
30	50	65	45	60
15	55	70	50	65
5	60	75	55	70
1	65	80	60	75
0	70	85	65	80

[A]Noise-sensitive land uses include residences, schools, hospitals, churches, and public libraries.
Source: County of Alameda, 1988.

A summary of these various LORS is presented in Table 8.5-9.

TABLE 8.5-9
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Noise

LORS	Applicability	AFC Conformance Section
Federal Offsite: USEPA	Guidelines for state and local governments.	Not Applicable
Federal Onsite: OSHA	Exposure of workers over 8-hour shift limited to 90 dBA.	Section 8.5.3.7. Also see Worker Safety section of AFC.
State-Onsite: Cal/OSHA 8 CCR Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Section 8.5.3.7. Also see Worker Safety section of AFC.
State-Offsite: Calif. Vehicle Code Sections 23130 and 23130.5	Regulates vehicle noise limits on California highways.	Delivery trucks and other vehicles will meet Code requirements.
Local California Government Code Section 65302	Requires local government to prepare plans which contain noise provisions.	Alameda County conforms
Alameda County Noise Element and Community Noise Ordinance	Establishes outdoor noise level limit of 60 dB CNEL and indoor noise level criterion of 45 dB CNEL. Nighttime maximum sound level of 45 dBA.	Section 8.5.4.3
Contra Costa County Noise Element	Establishes outdoor noise level limit of 60 dBA DNL and indoor noise level criterion of 45 dBA DNL.	Section 8.5.4.3
San Joaquin County Zoning Ordinance	Nighttime maximum sound level of 45 dBA at residential property lines.	Section 8.5.4.3

8.5.5 Permits Required and Permit Schedule

No permits are required; therefore, there is no permit schedule.

8.5.6 Involved Agencies and Agency Contacts

Agency contacts relative to noise issues are presented in Table 8.5-10.

TABLE 8.5-10
Agency Contacts for EAEC Noise

Agency	Contact	Telephone
Alameda County	Darin Ranalletti	(510) 670-5400
Contra Costa County	Bob Hendry	(925) 335-1375
San Joaquin County	Jeff Fischer	(209) 468-2193

8.5.7 References

Acoustics-Attenuation of Sound during Propagation Outdoors, Part 2, A General Method of Calculation, ISO 9613-2, International Organization for Standardization, Geneva. 1989.

Alameda County, Community Noise Ordinance, 1988.

County of Alameda. 1988. Community Noise Ordinance.

County of Alameda. 1994. Noise Element of the General Plan.

County of Alameda. 1995. East County Area Plan.

Barnes, J.D., L.N. Miller, and E.W. Wood. 1976. Prediction of Noise from Power Plant Construction. Bolt Beranek and Newman, Inc., Cambridge, Massachusetts. Prepared for Empire State Electric Energy Research Corporation, Schenectady, New York.

Beranek, L.L. 1988. Noise and Vibration Control. Institute of Noise Control Engineering. McGraw Hill.

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Contra Costa County. Noise Element of the General Plan, July 1996

Hessler Associates, Inc. *Expected Baseline EAEC Plant Noise Emission Contours*, November 28, 2000.

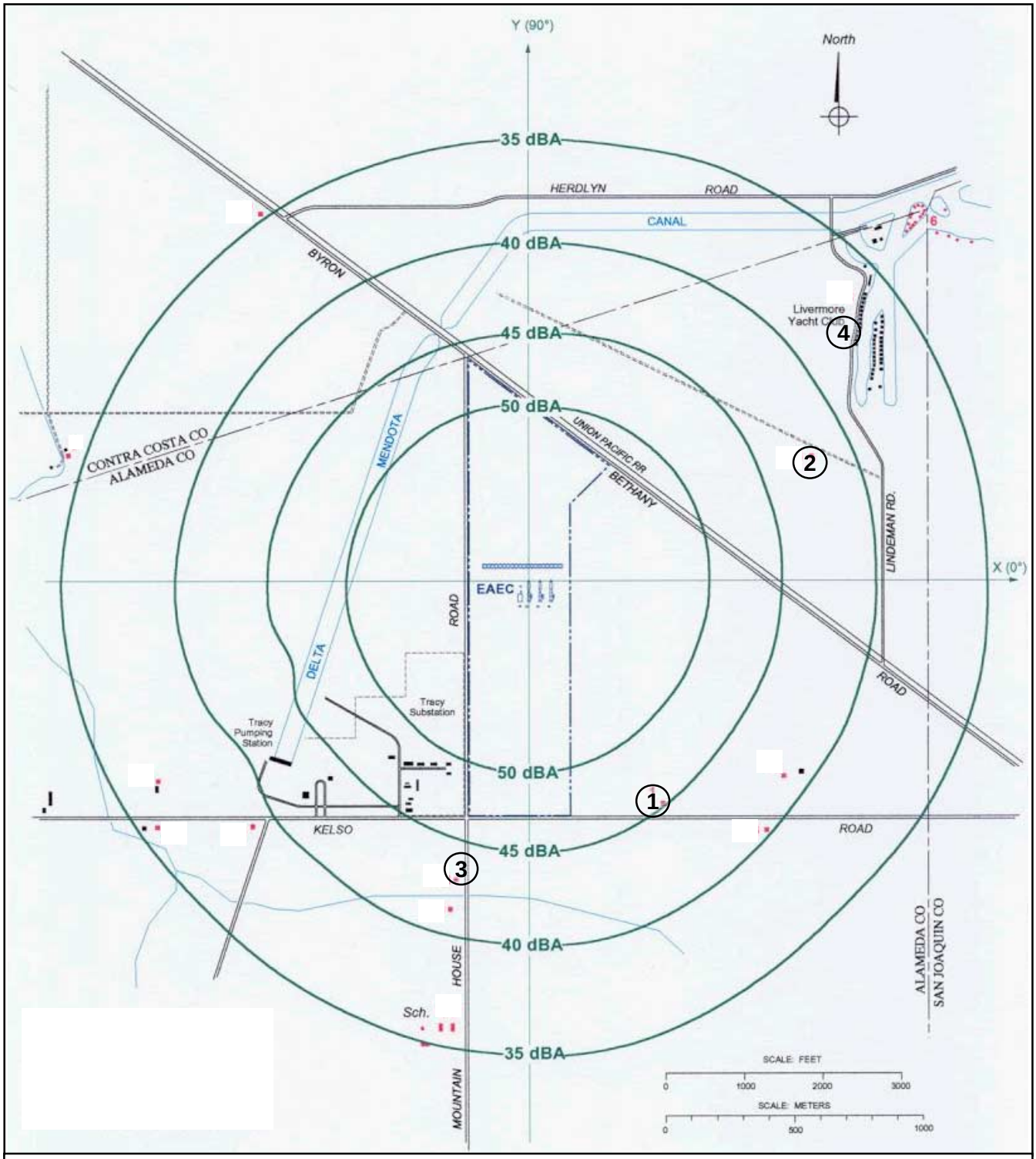
International Organization for Standardization. 1989. Acoustics-Attenuation of Sound during Propagation Outdoors, Part 2, A General Method of Calculation, ISO 9613-2, Geneva.

Miller, L.N., E.W. Wood, R.M. Hoover, A.R. Thompson, and S.L. Thompson, and S.L. Paterson. 1978. *Electric Power Plant Environmental Noise Guide*, Vol. 1. Bolt Beranek & Newman, Inc. Cambridge, MA. Prepared for the Edison Electric Institute, New York, NY.

San Joaquin County. Zoning Ordinance, March 1997.

U.S. Environmental Protection Act (USEPA). 1971. Noise from Construction Equipment and Operations, US Building Equipment, and Home Appliances. Prepared by Bolt Beranek and Newman for USEPA Office of Noise Abatement and Control, Washington, DC.

U.S. Environmental Protection Act (USEPA). 1974. Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. 550/9-74-004, Office of Noise Abatement and Control, Washington, DC.



(1) Noise Monitoring Locations

FIGURE 8.5-1
Expected Baseline Plant Noise Emissions During Normal Steady State Operation

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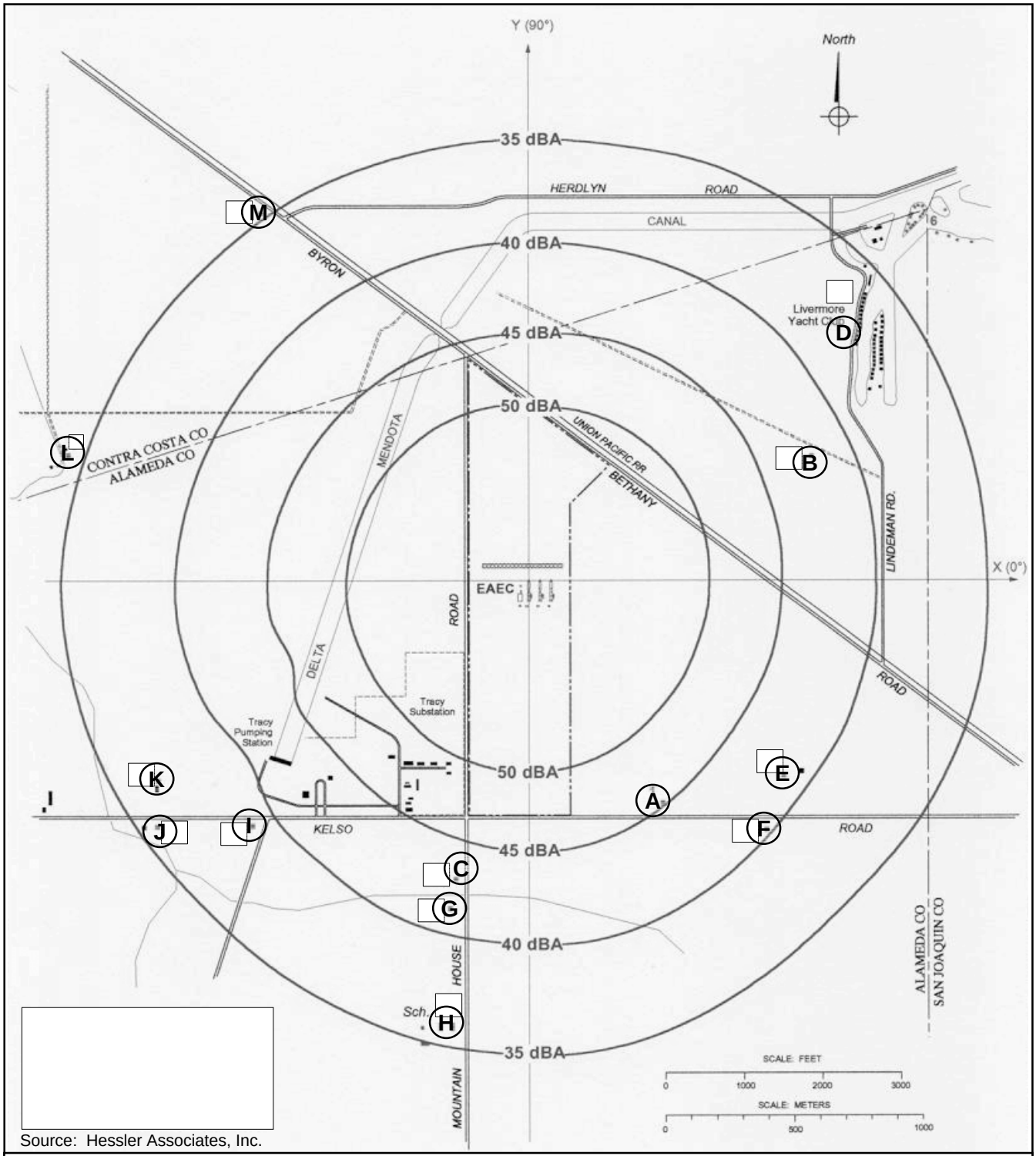

Source: Hessler Associates, Inc.

FIGURE 8.5-2
East Altamont Energy Center
Sensitive Noise Receptor Locations

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8.6 Public Health

This section presents an assessment of risks to human health potentially associated with operation of the proposed facility, focusing on chemical pollutants that could be emitted or released. Section 8.6.1 describes the affected environment. Section 8.6.2 discusses the environmental consequences. Section 8.6.3 presents the mitigation measures, and 8.6.5 presents the Public Health LORS applicable to the EAEC project. Section 8.6.5 provides a list of references used in preparing this section of this AFC.

Air pollutants for which California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS) have been established are also addressed in Section 8.1 of this AFC.

The principal concerns for public health are associated with emissions of chemical substances to the air during routine operation of the proposed facility. Chemical substances in air that potentially pose risks to human health include by-products from the combustion of natural gas. These chemical substances, which were addressed in a health risk assessment, included the following:

- Acetaldehyde
- Acrolein
- Ammonia
- Benzene
- Formaldehyde
- Toluene
- Xylene

Combustion by-products with established CAAQS or NAAQS, including NO_x, carbon monoxide, and respirable particulate matter are addressed in Criteria Pollutants and Air Quality Trends (Section 8.1.3). However, some discussion of the potential health risks associated with these substances is presented in this section. Human health risks potentially associated with accidental releases of stored acutely hazardous materials at the proposed facility (anhydrous ammonia) are also discussed in this section.

8.6.1 Affected Environment

The EAEC will be a nominal 1,100-MW natural-gas-fired, combined-cycle generating facility, with a 230-kV switchyard and approximately 0.5 mile of new 230-kV transmission line. The EAEC site will comprise up to 55 acres within a 174-acre parcel of land located in unincorporated Alameda County, approximately 1 mile west of the San Joaquin County line, and 1 mile south and east of the Contra Costa County line. The site is located approximately 8 miles northwest of the city of Tracy, 12 miles east of Livermore, 5 miles south of Byron, and less than 1 mile from the San Joaquin County border and the Mountain House Community Service District, a new town just starting Phase 1 construction. Large infrastructure projects, principally power generation and transmission facilities (listed in Land Use, Section 8.4), dominate the landscape within less than 1 mile of the project. Existing land uses and zoning designations for the proposed site and vicinity include

agricultural, low-density residential, and recreational uses (see Table 8.4-3 for further details).

The site is bounded to the north by the Southern Pacific Railroad Corridor/Byron Bethany Road, to the east and south by Kelso Road, and to the west by Mountain House Road. The parcel is currently being used for agricultural purposes, including oat, alfalfa and hay crops, and occasionally row crops such as tomatoes. An existing dairy barn structure on the site indicates that portions of the site had been previously used for dairy cows. Also, a single-family residence, which would be vacated subsequent to the construction and operation of the project, currently exists on the property.

There are few sensitive receptor facilities (such as schools, daycare facilities, convalescent centers, or hospitals) in the vicinity of the project site. The nearest sensitive receptor is an elementary school located less than 1 mile south of the project site (Mountain House School). There are also a few residences (primarily farmers) in the vicinity of the site. Sensitive receptors within a 3-mile radius of the project site are shown on Figure 8.6-1. Additional information describing sensitive receptors is presented in the Section 8.12, Hazardous Materials Handling.

Figure 8.6-1 shows the terrain within a 10-mile radius of EAEC, including land elevations greater than the combustion turbine exhaust stack heights. This figure serves as an index for the nine 7.5-minute Quad maps (five copies of which will be submitted to the California Energy Commission independently of Volume 1 of the AFC).

8.6.2 Environmental Consequences

Environmental consequences potentially associated with the project are potential human exposure to chemical substances emitted into the air. The human health risks potentially associated with these chemical substances were evaluated in a health risk assessment. The chemical substances potentially emitted to the air from the proposed facility include ammonia, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs) from the combustion turbines and auxiliary boiler, and ammonia and trace metals from the cooling tower. These chemical substances are listed in Table 8.6-1.

8.6.2.1 Criteria Pollutants

Emissions of criteria pollutants will adhere to NAAQS or CAAQS as discussed in the Affected Environmental section (see Section 8.1.4). The proposed facility also will include emission control technologies necessary to meet the required emission standards specified for criteria pollutants under Bay Area Air Quality Management District (BAAQMD) rules. Offsets will be required for emissions of criteria pollutants that exceed specified thresholds, to ensure that the project will not result in an increase in total emissions in the vicinity. Finally, air dispersion modeling results (presented in the Overview of the Analytical Approach to Estimating Facility Impacts section, Section 8.1.5.1) show that emissions will not result in concentrations of criteria pollutants in air that exceed ambient air quality standards (either NAAQS or CAAQS). These standards are intended to protect the general public with a wide margin of safety. Therefore, the project is not anticipated to have a significant impact on public health from emissions of criteria pollutants.

8.6.2.2 Toxic Pollutants

Potential impacts associated with emissions of toxic pollutants to the air from the proposed facility were addressed in a health risk assessment, presented in Appendix 8.1C. The risk assessment was prepared using guidelines developed under the AB 2588 Air Toxics "Hot Spots" Information and Assessment Act (California Air Pollution Control Officers Association [CAPCOA], 1993).

TABLE 8.6-1
Chemical Substances Potentially Emitted to the Air from EAEC

Criteria Pollutants	**Non-Criteria Pollutants (Toxic Pollutants) continued**
Carbon monoxide	Polycyclic aromatic hydrocarbons (PAHs)
Oxides of nitrogen	Benzo(a)anthracene
Particulate matter	Benzo(a)pyrene
Non-Criteria Pollutants (Toxic Pollutants)	Benzo(b)fluoranthene
Ammonia	Benzo(k)fluoranthene
Acetaldehyde	Chrysene
Acrolein	Dibenz(a,h)anthracene
1,3-Butadiene	Indeno(1,2,3-cd)pyrene
Benzene	Naphthalene
Ethylbenzene	Arsenic
Formaldehyde	Cadmium
Hexane	Chromium
Propylene	Copper
Propylene oxide	Lead
Toluene	Mercury
Xylene	Nickel
	Silver
	Zinc

Emissions of toxic pollutants potentially associated with the facility were estimated using emission factors approved by BAAQMD and the USEPA. Concentrations of these pollutants in air potentially associated with the emissions were estimated using dispersion modeling. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in a risk assessment, accounting for site-specific terrain and meteorological conditions. Health risks potentially associated with the estimated concentrations of pollutants in air were characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with reference exposure levels for noncancer health effects (for noncarcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI). The hypothetical MEI is an individual assumed to be located at the point where the highest concentrations of air pollutants associated with facility emissions are predicted to occur, based on air dispersion modeling. Human health risks associated with emissions from the proposed facility are unlikely to be higher at any other location than at the location of the MEI. If there is no significant impact associated with concentrations in air at the MEI location, it is unlikely that there would be significant impacts in any location in the vicinity of the facility.

Health risks potentially associated with concentrations of carcinogenic pollutants in air were calculated as estimated excess lifetime cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of the concentration in air and a unit risk value. The unit risk value is defined as the estimated probability of a person contracting cancer as a

result of constant exposure to an ambient concentration of 1 µg/m^3 over a 70-year lifetime. In other words, it represents the increased cancer risk associated with continuous exposure to a concentration in air over a 70-year lifetime. Evaluation of potential noncancer health effects from exposure to short-term and long-term concentrations in air was performed by comparing modeled concentrations in air with reference exposure levels (RELs). An REL is a concentration in air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential noncancer effects were evaluated by calculating a ratio of the modeled concentration in air and the REL. This ratio is referred to as a hazard quotient. The unit risk values and RELs used to characterize health risks associated with modeled concentrations in air were obtained from the *Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines* (CAPCOA, 1993), and are presented in Table 8.6-2.

TABLE 8.6-2
Toxicity Values Used to Characterize Health Risks for EAEC Public Health

Compound	Unit Risk Factor (µg/m^3)$^{-1}$	Chronic Reference Exposure Level (µg/m^3)	Acute Reference Exposure Level (µg/m^3)
Acetaldehyde	2.7E-06	9.00E+00	--
Acrolein	--	2.00E-02	0.19E-01
Ammonia	--	1.00E+02	3.2E+03
Arsenic	3.3E-03	5.10E-01	--
Benzene	2.9E-05	7.10E+01	--
1,3-Butadiene	1.7E-04	--	--
Cadmium	4.2E-03	3.50E+00	--
Chromium	1.4E-01	2.00E-03	--
Copper	--	2.40E+00	--
Ethylbenzene	--	--	--
Formaldehyde	6.0E-06	3.60E+00	9.4E+01
Hexane	--	--	--
Lead	8.00E-05	1.50E+00	--
Mercury	--	--	3.00E+01
Naphthalene	--	--	--
Nickel	--	--	--
Polycyclic aromatic hydrocarbons	1.7E-03	--	--
Propylene	--	--	--
Propylene oxide	3.7E-06	3.00E+01	3.10E+03
Silver	--	--	--
Toluene	--	2.00E+02	--
Xylene	--	3.00E+02	2.2E+04
Zinc	--	3.50E+01	--

Source: CAPCOA, 1993.

Toxic Air Pollutant Risks. The excess lifetime cancer risk associated with concentrations in air estimated for routine operation of the facility, at the MEI location is estimated to be 0.26

in one million (0.26×10^{-6}). Emissions from the emergency diesel fire pump engine may produce concentrations in air that are associated with an excess lifetime cancer risk of 0.9 in one million (0.9×10^{-6}). Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix 8.1C. As described in this appendix, the maximum impacts from these different emissions sources fall at geographically distinct locations. Therefore, cumulative maximum risks associated with emissions from routine operations and emissions from the emergency diesel fire pump engine will fall below a level of one in one million (1×10^{-6}).

Excess lifetime cancer risks less than 1×10^{-6} are unlikely to represent significant public health impacts that require additional controls of facility emissions. Risks higher than 1×10^{-6} may or may not be of concern, depending upon several factors. These include conservatism of assumptions used in risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Risks associated with pollutants potentially emitted from the facility are presented by exposure pathway in Table 8.6-3. As described previously, human health risks associated with emissions from the proposed facility are unlikely to be higher at any other location than at the location of the MEI. If there is no significant impact associated with concentrations in air at the MEI location, it is unlikely that there would be significant impacts in any other location in the vicinity of the facility.

TABLE 8.6-3
Summary of Excess Lifetime Cancer Risks for the Maximum Exposed Individual for EAEC Public Health

	Increased Lifetime Cancer Risk by Exposure Pathway				
Emission Source	**Inhalation of Ambient Air**	**Soil Ingestion**	**Dermal Contact with Soil**	**Ingestion of Garden Fruits and Vegetables[a]**	**Infant Ingestion of Mother's Milk**
Cooling Tower	6.41×10^{-9}	3.76×10^{-9}	7.95×10^{-11}		
Combustion Sources [b]	1.00×10^{-7}	4.57×10^{-8}	2.90×10^{-8}		7.57×10^{-8}
Total Pathway Risk	1.07×10^{-7}	4.95×10^{-8}	2.91×10^{-8}		
Total Risk	**0.26×10^{-6}**				

[a]Potential risks through this pathway are expected to be small compared with other exposure pathways, i.e. inhalation of ambient air.

[a]Combustion sources include turbines and auxiliary boiler.

The chronic noncancer hazard quotients associated with concentrations in air estimated for the MEI location were well below one for all target organs. A noncancer hazard quotient less than one is unlikely to represent a significant impact to public health. Chronic noncancer hazard quotients associated with inhalation of pollutants potentially emitted from the facility are presented in Table 8.6-4. The chemicals providing the largest contribution to noncancer risks associated with facility emissions are acrolein and ammonia, from combustion sources. The results presented in Table 8.6-4 show that adverse noncancer effects at any target organ from inhalation exposure to facility emissions are unlikely to occur. Chronic noncancer hazard indices for non-inhalation exposure pathways are presented in Table 8.6-5. The chronic noncancer hazard indices associated with non-inhalation exposure pathways are well below one for all target organs, indicating that adverse noncancer effects from non-inhalation exposure pathways are unlikely to occur. A noncancer REL is not available for lead. However, lead exposures are well below typical estimates of average daily exposures estimated for lead (Agency for Toxic Substances and Site Registry [ATSDR], 1999).

TABLE 8.6-4
Summary of Chronic Noncancer Hazard Quotients (Inhalation Exposure Pathway)
for the Maximum Exposed Individual for EAEC Human Health

	Target Organ[a]							
Emission Source	**Resp**	**CV/BL**	**CNS**	**Skin**	**Repro**	**Kidn**	**GI/LV**	**Immun**
Cooling Tower	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--
Combustion Sources[b]	0.0698	<0.0001	<0.0001	<0.0156	<0.0001	<0.0001	<0.0001	--
Total Chronic Hazard Quotient	0.0699	0.0001	<0.0001	0.0156	<0.0001	<0.0001	<0.0001	--
Total, All Pathways	0.0856							

[a]Resp = respiratory
[b]Combustion sources include turbines, fire pump engine, emergency generator engine, and auxiliary boiler
CV/BL = cardiovascular/blood
CNS = central nervous system
Repro = reproductive system
Kidn = renal system
GI/LV = gastrointestinal/liver
Immun = immunological system

TABLE 8.6-5
Summary of Chronic Noncancer Hazard Quotients (Non-Inhalation Exposure Pathway)
for the Maximum Exposed Individual for EAEC Human Health

	Total Dose from Non-Inhalation Exposure Pathways (mg/kg-d)			
Chemical	**Cooling Tower**	**Combustion Sources**	**REL (mg/kg-d)**	**Hazard Quotient (Total Dose/REL)**
Arsenic and compounds	2.54E-09	--	3.00E-04	8.47E-06
Cadmium and compounds	1.29E-09	--	1.00E-03	1.29E-06
Lead and compounds	3.45E-09	--	--	--
Mercury and compounds	1.50E-09	--	3.00E-04	5.00E-06
Naphthalene	--	2.99E-08	--	--
PAH	--	6.23E-09	--	--

The acute noncancer hazard quotients associated with concentrations in air are shown in Table 8.6-6. The noncancer hazard quotients of all individual pollutants fall below one for all target organs. The chemicals providing the largest contribution to acute noncancer health risks are ammonia and acrolein. The combined hazard index summed across all pollutants also falls below one. As described previously, a chronic or an acute hazard index less than one is unlikely to represent significant impact to public health. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix 8.1C. As described previously, human health risks associated with emissions from the proposed facility are unlikely to be higher at any other location than at the location of the MEI. If there is no significant impact associated with concentrations in air at the MEI location, it is unlikely that there would be significant impacts in any other location in the vicinity of the facility.

TABLE 8.6-6
Summary of HRA Modeling Results
East Altamont Energy Center
Acute Inhalation Hazard Index

Pollutant Name	Maximum Modeled 1-hour Concentration		Acute REL, µg/m3	Toxicological Endpoints	Acute Inhalation Hazard Quotient	
	Combustion Sources	Cooling Tower			Combustion Sources	Cooling Tower
Acrolein	2.15E-02		1.90E-01	Eye irritation	1.13E-01	
Ammonia	4.60E+01		3.20E+03	Eye and respiratory irritation	1.44E-02	
Arsenic		2.52E-05	1.90E-01	Reproductive/Developmental		1.33E-04
Benzene	4.56E-02		1.30E+03	Reproductive/Developmental	3.51E-05	
Copper		5.04E-05	1.00E+02	Respiratory Irritation		5.04E-07
Formaldehyde	9.23E-01		9.40E+01	Eye irritation	9.82E-03	
Mercury		1.26E-05	1.80E+00	Reproductive/Developmental		7.00E-06
Nickel		1.26E-04	6.00E+00	Respiratory Irritation/Immune Response		2.10E-05
Propylene oxide	4.01E-01		3.10E+03	Eye and respiratory irritation	1.29E-04	
Toluene	2.37E-01		3.70E+04	CNS (mild); eye and respiratory irritation	6.41E-06	
Xylenes	2.19E-01		2.20E+04	Eye and respiratory irritation	9.95E-06	
Total Acute Hazard Index					**0.138**	

Characterization of Risks from Toxic Air Pollutants. The estimates of excess lifetime cancer risks, and noncancer risks associated with chronic or acute exposures, fall below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have been used to extrapolate from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans (i.e., the assumption being that man is as sensitive as the most sensitive animal species). Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero (USEPA, 1986; USEPA, 1996).

An excess lifetime cancer risk of 1×10^{-6} is typically used as a threshold of significance for potential exposure to carcinogenic substances in air. The excess cancer risk level of 1×10^{-6} that has historically been judged to be an acceptable risk originates from efforts by the Food and Drug Administration (FDA) to use quantitative risk assessment for regulating carcinogens in food additives in light of the zero tolerance provision of the Delany Amendment (Hutt, 1985). The associated dose, known as a "virtually safe dose" (VSD), has become a standard used by many policymakers and the lay public for evaluating cancer risks. However, a recent study of regulatory actions pertaining to carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions found that regulatory action was not taken to control estimated risks below 1×10^{-6} (one-in-one million), which are called *de minimis* risks. *De minimis* risks are historically considered risks of

no regulatory concern. Chemical exposures with risks above 4×10^{-3} (four-in-ten thousand), called *de manifestis* risks, were consistently regulated. *De manifestis* risks are typically risks of regulatory concern. The risks falling between these two extremes were regulated in some cases, but not in others (Travis et al., 1987).

The estimated lifetime cancer risks to the MEI are less than 1×10^{-6}, and the aggregated cancer burden associated with this risk level is less than one excess cancer case. These risk estimates were calculated using assumptions that are highly health conservative. Evaluation of the risks associated with the facility emissions should consider that the conservatism in the assumptions and methods used in risk estimation considerably overstate the risks from facility emissions. Based on the results of the risk assessment, there are no significant public health impacts anticipated from emissions of toxic pollutant to the air from the proposed facility.

8.6.2.3 Hazardous Materials

Hazardous materials will be used and stored at the facility. The hazardous materials stored in significant quantities onsite and descriptions of their uses are presented in Section 8.12. Use of chemicals at the proposed facility will be in accordance with standard practices for storage and management of hazardous materials. Normal use of hazardous materials, therefore, will not pose significant impacts to public health. While mitigation measures will be in place to prevent releases, accidental releases that migrate offsite could result in potential impacts to the public.

The California Health and Safety Code Sections 25531 to 25541 and Code of Federal Regulations (CFR) Title 40 Part 68 under the Clean Air Act establish emergency response planning requirements for acutely hazardous materials. These regulations require preparation of a Risk Management Plan (RMP), which is a comprehensive program to identify hazards and predict the areas that may be affected by a release of an acutely hazardous material (AHM). AHMs to be used at the facility include anhydrous ammonia as discussed in Section 8.12. Anhydrous ammonia may generate hazardous gases that could migrate offsite when released.

A vulnerability analysis will be performed during the AFC process to assess potential risks to humans at various distances from the site if a spill or rupture of the anhydrous ammonia storage tank were to occur.

8.6.2.4 Operation Odors

Small amounts of ammonia used to control NO_x emissions may escape up the exhaust stack but would not produce operational odors. The expected exhaust gas ammonia concentration, known as ammonia "slip," will be less than 10 ppm. After mixing with the atmosphere, the concentration at ground level will be far below the detectable odor threshold of 5 ppm that the Compressed Gas Association has determined to be acceptable. Therefore, potential ammonia emissions are not expected to create objectionable odors. Other combustion contaminants are not present at concentrations that could produce objectionable odors.

8.6.3 Mitigation Measures

8.6.3.1 Criteria Pollutants

Emissions of criteria pollutants will be minimized by applying Best Available Control Technology (BACT) to the facility. BACT for the combustion turbine includes the combustion of natural gas.

The proposed project location is in an area that is designated by the state as nonattainment for ozone and particulate matter (PM). Therefore, all increases in emissions of NO_x, VOC, and PM_{10} must be fully offset if emissions exceed specified trigger limits. The combination of using BACT and providing emission offsets as needed will result in no net increase in criteria pollutants. Therefore, further mitigation of emissions is not required to protect public health.

8.6.3.2 Toxic Pollutants

Emissions of toxic pollutants to the air will be minimized through the use of natural gas as the only fuel at the proposed facility (except for emergency equipment). Emissions from tanks storing liquid organic chemicals will be minimized through the use of vapor recovery systems as necessary to comply with applicable LORS.

8.6.3.3 Hazardous Materials

Mitigation measures for hazardous materials are presented below and discussed in more detail in Section 8.12. Potential public health impacts from the use of hazardous materials are expected to occur only as a result of an accidental release. The plant has many safety features designed to prevent and minimize impacts from the use and accidental release of hazardous materials. The EAEC will include the following design features:

- Curbs, berms, and/or concrete pits will be provided where accidental release of chemicals may occur.
- A fire protection system will be included to detect, alarm, and suppress a fire, in accordance with the applicable LORS.
- Construction of the anhydrous ammonia storage system will be in accordance with applicable LORS.

An RMP for the EAEC facility will be prepared prior to commencement of facility operations. The RMP will estimate the risk presented by handling ammonia at the facility. The RMP will include a hazard analysis, offsite consequence analysis, seismic assessment, emergency response plan, and training procedures. The RMP process will accurately identify and propose adequate mitigation measures to reduce the risk to the lowest possible level.

A safety program will be implemented and will include safety training programs for contractors and operations personnel, including instructions on (1) the proper use of personal protective equipment, (2) safety operating procedures, (3) fire safety, and (4) emergency response actions. The safety program will also include programs on safely operating and maintaining systems that use hazardous materials. Emergency procedures for

EAEC personnel include generating facility evacuation, hazardous material spill cleanup, fire prevention, and emergency response.

Areas subject to potential leaks of hazardous materials will be paved and bermed. Incompatible materials will be stored in separate containment areas. Containment areas will be drained to either an oily waste collection sump or to the wastewater neutralization tank. Also, piping and tanks exposed to potential traffic hazards will be additionally protected by traffic barriers.

8.6.4 Laws, Ordinances, Regulations, and Standards

An overview of the regulatory process for public health issues is presented in this section. The relevant LORS that affect public health and are applicable to this project are identified in Table 8.6-7. Table 8.6-7 also summarizes the primary agencies responsible for public health, as well as the general category of the public health concern regulated by each of these agencies. The conformity of the project to each of the LORS applicable to public health is also presented in this table, as well as references to the selection locations within this report where each of these issues is addressed. Points of contact with the primary agencies responsible for public health are identified in Table 8.6-8.

TABLE 8.6-7
Summary of Primary Regulatory Jurisdiction for EAEC Public Health

LORS	Public Health Concern	Primary Regulatory Agency	Project Conformance/AFC Conformance Section
Clean Air Act	Public exposure to air pollutants	USEPA Region IX CARB BAAQMD	Based on results of risk assessment per CAPCOA guidelines, toxic contaminants do not exceed acceptable levels. (see Section 8.6.2.2) Emissions of criteria pollutants will be minimized by applying BACT to the facility. Increases in emissions of criteria pollutants will be fully offset. (Section 8.6.3.1)
Health and Safety Code 25249.5 *et seq*. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	Office of Environmental Health and Hazard Assessment (OEHHA)	Based on results of risk assessment per CAPCOA guidelines, toxic contaminants do not exceed thresholds that require exposure warnings. (see Section 8.6.2.2)
40 CFR Part 68 (Risk Management Plan)	Public exposure to acutely hazardous materials	USEPA Region IX Alameda County Office of Emergency Services (OES) City of Tracy Fire Department	A vulnerability analysis will be performed to assess potential risks from a spill or rupture of the anhydrous ammonia storage tank. (See Section 8.6.2.3) An RMP will be prepared prior to commencement of facility operations. (See Section 8.6.3.3)
Health and Safety Code Sections 25531 to 25541	Public exposure to acutely hazardous materials	Alameda County Office of Emergency Services (OES) CARB BAAQMD	A vulnerability analysis will be performed to assess potential risks from a spill or rupture of the anhydrous ammonia storage tank. (See Section 8.6.2.3)
Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Public exposure to toxic air contaminants	CARB BAAQMD	Based on results of risk assessment per CAPCOA guidelines, toxic contaminants do not exceed acceptable levels. (see Section 8.6.2.2)

TABLE 8.6-8
Summary of Agency Contacts for EAEC Public Health

LORS	Public Health Concern	Primary Regulatory Agency	Regulatory Contact
Clean Air Act	Public exposure to air pollutants	USEPA Region IX	David Howekamp, 916/744-1219
		CARB	Ray Menebroker, 916/322-6026
		BAAQMD	TBD
Health and Safety Code 25249.5 *et seq*. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	Office of Environmental Health and Hazard Assessment (OEHHA)	Cynthia Oshita or Susan Long, 916/445-6900
40 CFR Part 68 (Risk Management Plan)	Public exposure to acutely hazardous materials	USEPA Region IX	David Howekamp, 916/744-1219
		Alameda County Environmental Management	Rob Weston 510/567-6700
		Alameda County Fire Department	Bob Bowman 510/670-5853
Health and Safety Code Sections 25531 to 25541	Public exposure to acutely hazardous materials	Alameda County Environmental Management	Rob Weston 510/567-6700
		BAAQMD	Brian Bateman 415/749-4653
Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Public exposure to toxic air contaminants	CARB	Ray Menebroker, 916/322-6026
		BAAQMD	Brian Bateman 415/749-4653

8.6.5 References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. *Toxicological Profile for Lead. Update.*

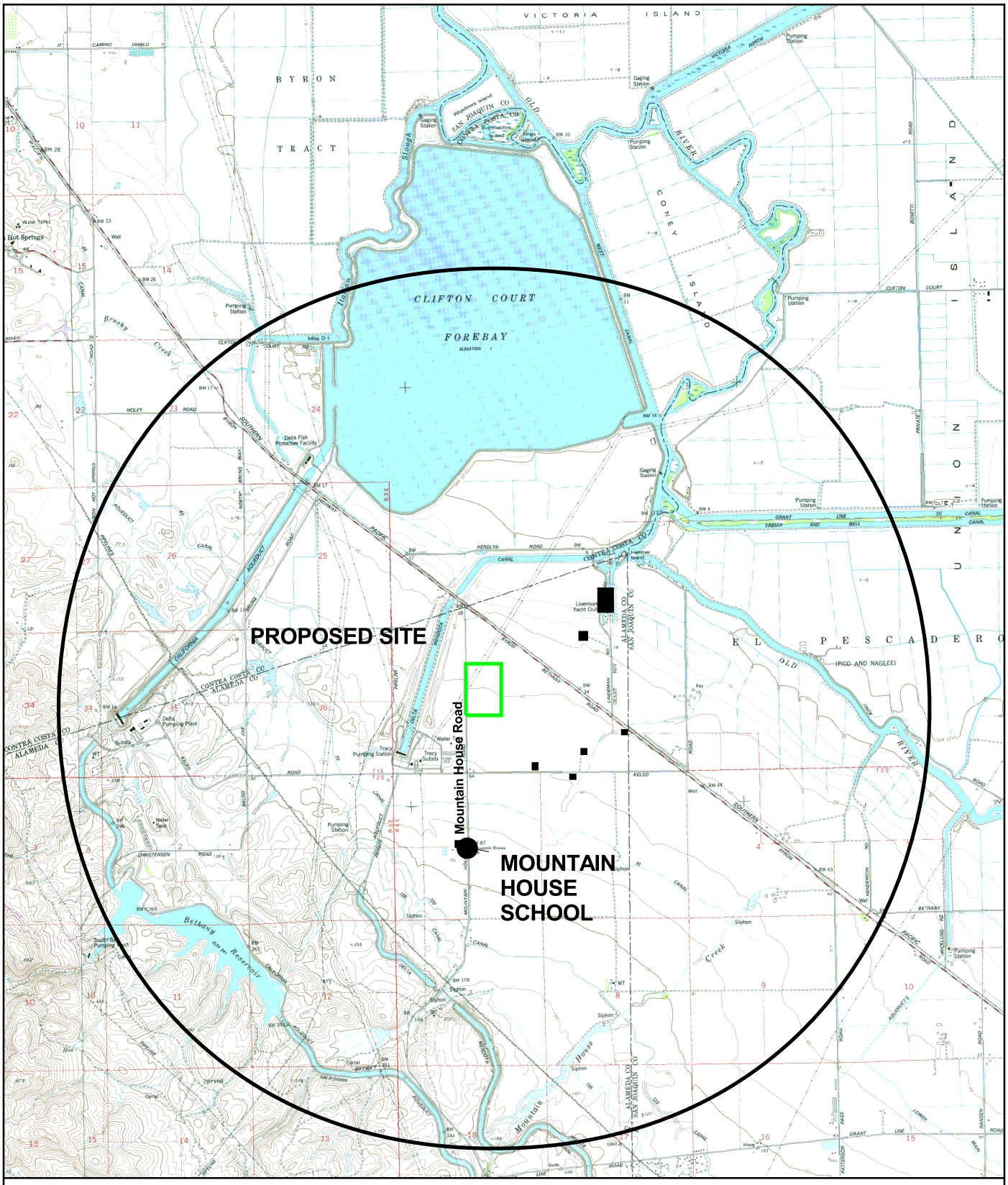
California Air Pollution Control Officers Association (CAPCOA). 1993. *Air Toxics "Hot Spots" Program, Revised 1992 Risk Assessment Guidelines.* October.

Hutt, P.B. 1985. Use of quantitative risk assessment in regulatory decisionmaking under federal health and safety statutes, in *Risk Quantitation and Regulatory Policy*. Eds. D.G. Hoel, R.A. Merrill, and F.P. Perera. Banbury Report 19, Cold Springs Harbor Laboratory.

Travis, C.C., E.A.C. Crouch, R. Wilson, and E.D. Klema. 1987. Cancer risk management: a review of 132 federal regulatory cases. *Environ. Sci. Technol*. 21:415-420.

U.S. Environmental Protection Agency (USEPA). 1986. Guidelines for carcinogen risk assessment. *Federal Register*. 51:33992. September 24.

USEPA. 1996. *Proposed Guidelines for Carcinogen Risk Assessment*. Office of Health and Environmental Assessment. EPA/600/P-92/003C. April.



LEGEND

- PROJECT SITE
- RESIDENCE

N

1 0 1 Miles

SCALE IS APPROXIMATE

FIGURE 8.6-1
SENSITIVE RECEPTORS WITHIN 3 MILES OF EAEC SITE

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

8.7 Worker Health and Safety

This section summarizes the health and safety issues that could be encountered during construction and operation of the EAEC. It also contains information on the health and safety programs to be implemented during construction and operation, the safety training programs that will educate workers on hazards and hazard control methods, fire protection, and the worker LORS with which the project will comply. Section 8.7.1 contains a workplace description. Section 8.7.2 provides an overview of hazards and related programs and training. Health and safety programs are described in Section 8.7.3. Section 8.7.4 discusses safety training courses for employees on this project. Section 8.7.5 discusses fire protection. Section 8.7.6 discusses the LORS for construction and operation, Section 8.7.7 provides information on permitting agencies, contacts, and schedule. Section 8.7.8 provides agency contacts.

Prior to the start of construction of the EAEC plant, a Construction Safety Program will be developed that will include information on the hazards associated with this project, provide information on the control measures that must be implemented in order to protect construction personnel and visitors from the identified hazards, and outline procedures that must be complied with in order to operate in compliance with the LORS.

The primary components of the Construction Safety Program will include the following: Injury and Illness Prevention Program, Fire Protection and Prevention Program, Personal Protective Equipment Program, Emergency Action Program, and general Construction Safety Plan.

Once the plant has been constructed, a Health and Safety Program will be developed to cover the hazards associated with plant operations. This program will include pertinent information on the hazards associated with operating and maintaining the EAEC plant, and appropriate control measures, and will define what procedures need to be implemented in order to be in compliance with the LORS. The primary components of the Operations Health and Safety Program will include the following: Injury and Illness Prevention Program, Fire Protection and Prevention Program, Emergency Action Program, Personal Protective Equipment Program, and a general Plant Operations Safety Program.

Safety Training Programs will also be developed to ensure that employees recognize and understand how to protect themselves from the hazards associated with both construction and operations and maintenance of the EAEC plant.

An Emergency Response Plan, Business Plan, and Risk Management Plan will also be developed as required by Alameda County.

8.7.1 Workplace Description

The EAEC project will consist of the construction of three gas-fired turbines and one steam turbine. The project will generate approximately 1,100 MW of baseload generation.

The developed plant area will be roughly 55 acres. An overhead transmission line ROW will take modest additional space. The plant is located roughly midway on the site so that the plant stacks are more than 1 mile from Mountain House School, and the main footprint is

1,000 feet from the Byron Bethany Road (Route J4), a scenic highway. Additional detailed information on the facility and its location are described in Section 2.0.

During the life of the EAEC, workers will be exposed to the hazards typical of the construction and operation of a gas-fired facility. To evaluate these hazards and control measures, a hazard analysis was prepared. The analysis identified the hazards anticipated during construction and operation and indicated which safety programs should be developed and implemented to mitigate and appropriately manage those hazards. The hazard analysis prepared for construction activities is outlined in Table 8.7-1; the hazard analysis prepared for plant operation is outlined in Table 8.7-2. Since the types of hazards anticipated during plant construction and operation are similar, there is considerable duplication between the tables. However, it is anticipated that the situation in which a particular hazard will be encountered will differ in the construction and operation phases of the project.

8.7.2 Overview of Hazards and Related Programs and Training

Programs are overall plans that set forth the method or methods that will be followed to achieve particular health and safety objectives. For example, the Fire Protection and Prevention Program will describe what has to be done to protect against and prevent fires. This will include equipment required, such as alarm systems and firefighting equipment, and procedures to follow to protect against fires. The Emergency Action Program/Plan will describe escape procedures, rescue and medical procedures, alarm and communication systems, and response procedures for very hazardous materials that can migrate, such as ammonia. The programs or plans are contained in written documents that are usually kept at specific locations within the facility.

Each program or plan will contain training requirements that are translated into detailed training courses. These courses are taught to plant construction and operation personnel as needed. For example, all plant operation personnel will receive training in escape procedures under the Emergency Action Program/Plan, but only those working with flammables will receive training under the Fire Protection and Prevention Program.

Tables 8.7-1 and 8.7-2, which list construction and operation activities and associated hazards, also show (under the "Control" column) the program designed to reduce the occurrence of each hazard.

8.7.3 Health and Safety Programs

To protect the health and safety of workers during construction and operation of the EAEC, health and safety programs designed to mitigate hazards and comply with applicable regulations will be implemented. Periodic audits will be performed by qualified individuals to determine whether proper work practices are being used to mitigate hazardous conditions and to evaluate regulatory compliance.

The following sections contain information on the anticipated content of the health and safety programs.

TABLE 8.7-1
Construction Hazard Analysis

Activity	Hazard[a]	Control[a]
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operation	Same as heavy equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Prevention Program
		Scaffolding/Ladder Safety Program
		Articulating Boom Platforms Program
Use of cranes and derricks	Property damage from falling loads	Crane and Material Handling Program
	Employee injuries from falling loads	
	Injuries and property damage from contact with crane or derrick	
Working with flammable and combustible liquids	Fire/spills	Fire Protection and Prevention Program
		Housekeeping and Material Handling and Storage Program
Hot work (including cutting and welding)	Employee injury and property damage from fire	Hot Work Safety Program
	Exposure to fumes during cutting and welding	Respiratory Protection Program
	Ocular exposure to ultraviolet and infrared radiation during cutting and welding	Employee Exposure Monitoring Program
		Personal Protective Equipment Program
Inspection and maintenance of temporary systems used during construction activities	Employee injury and property damage from contact with hazardous energy sources (electrical, thermal, mechanical, etc.)	Electrical Safety Program
Working on electrical equipment and systems	Employee contact with live electricity and energized equipment	Electrical Safety Program
		Personal Protective Equipment Program
Confined space entry	Employee injury from physical and chemical hazards	Permit-Required Confined Space Entry Program
General construction activities	Employee injury from hand and portable power tools	Hand and Portable Power Tool Safety Program

TABLE 8.7-1
Construction Hazard Analysis

Activity	Hazard[a]	Control[a]
		Personal Protective Equipment Program
General construction activities	Employee injury/property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
General construction activities	Employee exposure to occupational noise	Hearing Conservation Program
		Personal Protective Equipment Program
General construction activities	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
General construction activity	Employee injury to head, eye/face, hand, body, foot, and skin	Personal Protective Equipment Program
General construction activity	Employee exposure to hazardous gases, vapors, dusts, and fumes	Hazard Communication Program
		Respiratory Protection Program Personal Protective Equipment Program Air Monitoring Program
General construction activity	Employee exposure to various hazards Reporting of hazardous conditions during construction	Injury and Illness Prevention Program Injury and Illness Prevention Program
General construction activity	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
Construction and testing of high-pressure steam and air systems	Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program
		Electrical Safety Program

[a]The hazards and hazard controls provided are generic to construction activities. During various phases of construction, a hazard analysis will be performed to evaluate the hazards and develop appropriate controls.

TABLE 8.7-2
Operation Hazard Analysis

Activity	Hazard[a]	Control[a]
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operations	Same as heavy equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Protection Program
		Scaffolding/Ladder Safety Program
Use of cranes or derricks	Property damage from falling loads	Crane and Material Handling Program
	Employee injuries from falling loads	
	Injuries and property damage from contact with crane or derrick	
Working with flammable and combustible liquids	Fire/spills	Fire Protection and Prevention Program
Working with hazardous materials	Employee injury due to ingestion, inhalation, dermal contact	Hazard Communication Program
Hot work (including cutting and welding)	Employee injury and property damage from fire	Hot Work Safety Program
	Exposure to fumes during cutting and welding	Respiratory Protection Program
	Ocular exposure to ultraviolet and infrared radiation during cutting and welding	Employee Exposure Monitoring Program
		Personal Protective Equipment Program
		Fire Protection and Prevention Program
Troubleshooting and maintenance of plant systems and general operation activities	Employee injury and property damage from contact with hazardous energy sources (electrical, thermal, mechanical, etc.)	Electrical Safety Program
Working on electrical equipment and systems	Employee contact with live electricity	Electrical Safety Program
		Personal Protective Equipment Program
Confined space entry	Employee injury from physical and chemical hazards	Permit-Required Confined Space Entry Program
General plant operation activities	Employee injuries from hand and portable power tools	Hand and Portable Power Tool Safety Program
		Personal Protective Equipment Program

TABLE 8.7-2
Operation Hazard Analysis

Activity	Hazard[a]	Control[a]
General plant operation activities	Employee injury and property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
General plant operation activities	Employee overexposure to occupational noise	Hearing Conservation Program
		Personal Protective Equipment Program
General plant operation activities	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
General plant operation activities	Employee injury and property damage from unsafe driving	Safe Driving Program
General plant operation activities	Employee overexposure to hazardous gases, vapors, dusts, and fumes	Hazard Communication Program
		Respiratory Protection Program
		Personal Protective Equipment Program
		Employee Exposure Monitoring Program
General plant operation activities	Reporting and repair of hazardous conditions	Injury and Illness Prevention Program
General plant operation activities	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
Maintenance and repair of high-pressure steam and air systems	Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program
		Electrical Safety Program
Ammonia storage	Ammonia release	Emergency Action Program/Plan
		Risk Management Plan (See Section 8.12)

[a]The hazard and hazard controls provided are generic to operational activities. This hazard analysis may have to be updated if plant operations change or new equipment is added that was not considered during this evaluation.

8.7.3.1 Construction Health and Safety Program

The Injury and Illness Prevention Program, Fire Protection and Prevention Program, Personal Protective Equipment Program, Emergency Action Program/Plan, and Construction Safety Programs that will be implemented during EAEC construction are outlined below.

Injury and Illness Prevention Program.

- Philosophy and safety commitment
- Safety leadership and responsibilities
- Accountability
- Specific core safety processes (See Components of the Construction Safety Program)
- Employee safety communication
- Planning "job hazard analysis and pre-task"
- Compliance with work rules and safe work practices
- Measurement of compliance and effectiveness of prevention methods
- Communication of performance and implementation of necessary improvements
- Training and other communication requirements

Fire Protection and Prevention Program.

- General requirements
- Housekeeping and proper material storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control and containment
- Flammable and combustible liquid storage
- Use of flammable and combustible liquids
- Dispensing and disposal of flammable liquids
- Service and refueling areas
- Training

Personal Protective Equipment Program.

- Personal protective devices
- Head protection
- Eye/face protection
- Body protection
- Hand protection
- Foot protection
- Skin Protection
- Fall protection
- High-voltage protection
- Respiratory protection
- Hearing protection
- Hazard analysis
- Training

Emergency Action Program/Plan.

- Emergency procedures for the protection of personnel, equipment, the environment, and materials
- Fire and emergency reporting procedures
- Response actions for accidents involving personnel and or property
- Bomb threats
- Site assembly and emergency evacuation route procedures
- Natural disasters response
- Reporting and notification procedures for emergencies; contacts, including offsite and local authorities
- Alarm and communication systems
- Spill response, prevention, and control action plan
- Emergency response equipment
- Emergency personnel (response team) responsibilities and notification roster
- Training requirements

Construction Safety Programs.

Motor Vehicle and Heavy Equipment Safety Program.

- Operation and maintenance of vehicles
- Inspection
- Personal Protective Equipment (PPE)
- Training

Forklift Operation Program.

- Trained and certified operators
- Fueling operations
- Safe operating parameters
- Training

Excavation/Trenching Program.

- Shoring, sloping, and benching requirements
- California Occupational Safety and Health Administration (Cal/OSHA) permit requirements
- Inspection
- Air monitoring
- Access and egress

Fall Protection Program.

- Evaluation of fall hazards
- Protection devices
- Training

Scaffolding/Ladder Safety Program.

- Construction and inspection of equipment
- Proper use
- Training

Articulating Boom Platforms Program.

- Inspection of equipment
- Load ratings
- Safe operating parameters
- Operator training

Crane and Material Handling Program.

- Certified and licensed operators
- Inspection of equipment
- Load ratings
- Safe operating parameters
- Training

Hot Work Safety Program.

- Welding and cutting procedures
- Fire watch
- Hot work permit
- PPE
- Training

Employee Exposure Monitoring Program.

- Exposure evaluation
- Monitoring requirements
- Reporting of results
- Medical surveillance
- Training

Electrical Safety Program.

- Grounding procedure
- Lock-out/tag-out (LO/TO) procedures
- Overhead and underground utilities
- Utility clearance
- Training

Permit-Required Confined Space Entry Program.

- Air monitoring and ventilation requirements
- Rescue procedures
- LO/TO and blocking, blinding, and blanking requirements
- Permit completion
- Training

Hand and Portable Power Tool Safety Program.

- Guarding and proper operation
- Training

Housekeeping and Material Handling and Storage Program.

- Storage requirements
- Walkways and work surfaces
- Equipment handling requirements
- Training

Hearing Conservation Program.

- Identifying high-noise environments
- Exposure monitoring
- Medical surveillance requirements
- Hearing protective devices
- Training

Back Injury Prevention Program.

- Proper lifting and material handling procedures
- Training

Hazard Communication Program.

- Labeling requirements
- Storage and handling
- Material Safety Data Sheets (MSDS)
- Chemical inventory
- Training

Respiratory Protection Program.

- Selection and use
- Storage
- Fit testing
- Medical requirements
- Inspection and repair
- Training

Heat and Cold Stress Monitoring and Control Program.

- Monitoring requirements
- Prevention and control

Pressure Vessel and Pipeline Safety Program.

- Line-breaking program
- Equipment inspection and maintenance
- Blocking, bleeding, and blanking
- Training

8.7.3.2 Operations Health and Safety Program

Upon completion of construction and commencement of operations at EAEC, the construction health and safety program will transition into an operations-oriented program reflecting the hazards and controls necessary during operation. Health and safety program outlines for the operations-oriented Injury and Illness Prevention Program, Fire Protection and Prevention Program, Emergency Action Program/Plan, PPE Program, and Plant Operation Safety Program are provided below.

Injury and Illness Prevention Program.

- Personnel with the responsibility and authority for implementing the plan
- Health and safety policy
- Work rules and safe work practices
- System for ensuring that employees comply with safe work practices
- Employee communications
- Identification and evaluation of workplace hazards
- Methods and/or procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazards
- Specific safety procedures (See Plant Operation Safety Program)
- Training and instruction

Fire Protection and Prevention Program.

- General requirements
- Fire hazard inventory, including ignition sources and mitigation
- Housekeeping and proper materials storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control
- Flammable and combustible liquid storage
- Use of flammable and combustible liquids
- Dispensing and disposal of liquids
- Training
- Personnel to contact for information on plan contents

Emergency Action Program/Plan (Part of the Risk Management Plan).

- Emergency escape procedures and emergency escape route assignments
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate
- Procedures to account for all employees after emergency evacuation has been completed
- Rescue and medical duties for those employees performing rescue and medical duties
- Fire and emergency reporting procedures
- Alarm and communication system
- Personnel to contact for information on plan contents
- Response procedure for ammonia release
- Training requirements

Personal Protective Equipment Program.

- Hazard analysis and prescription of PPE
- Personal protective devices
- Head protection
- Eye and face protection
- Body protection
- Hand protection
- Foot protection
- Skin Protection
- Sanitation
- Safety belts and life lines for fall protection
- Protection for electric shock
- Medical services and first aid/bloodborne pathogens
- Respiratory protective equipment
- Hearing protection
- Training

Plant Operation Safety Program.

Motor Vehicle and Heavy Equipment Safety Program.

- Operation and Maintenance of Vehicles
- Inspection
- Personal Protective Equipment
- Training

Forklift Operation Program.

- Trained and certified operators
- Fueling operations
- Safe operating parameters
- Training

Excavation/Trenching Program.

- Shoring, sloping, and benching requirements
- Cal/OSHA permit requirements
- Inspection
- Air monitoring
- Access and egress

Fall Protection Program.

- Evaluation of fall hazards
- Protection devices
- Training

Scaffolding/Ladder Safety Program.

- Construction and inspection of equipment
- Proper use
- Training

Articulating Boom Platforms Program.

- Inspection of equipment
- Load ratings
- Safe operating parameters
- Operator training

Crane and Material Handling Program.

- Certified and licensed operators
- Inspection of equipment
- Load ratings
- Safe operating parameters
- Training

Hot Work Safety Program.

- Welding and cutting procedures
- Fire watch
- Hot work permit
- PPE
- Training

Employee Exposure Monitoring Program.

- Exposure evaluation
- Monitoring requirements
- Reporting of results
- Medical surveillance
- Training

Electrical Safety Program.

- Grounding procedure
- LO/TO procedures
- Overhead and underground utilities
- Utility clearance
- Training

Permit-Required Confined Space Entry Program.

- Air monitoring and ventilation requirements
- Rescue procedures
- LO/TO and blocking, blinding, and blanking requirements
- Permit completion
- Training

Hand and Portable Power Tool Safety Program.

- Guarding and proper operation
- Training

Housekeeping and Material Handling and Storage Program.

- Storage requirements
- Walkways and work surfaces
- Equipment handling requirements
- Training

Hearing Conservation Program.

- Identifying high-noise environments
- Exposure monitoring
- Medical surveillance requirements
- Hearing protective devices
- Training

Back Injury Prevention Program.

- Proper lifting and material handling procedures
- Training

Hazard Communication Program.

- Labeling requirements
- Storage and handling
- MSDS
- Chemical inventory
- Training

Respiratory Protection Program.

- Selection and use
- Storage
- Fit testing
- Medical requirements
- Inspection and repair
- Training

Heat and Cold Stress Monitoring and Control Program.

- Monitoring requirements
- Prevention and control

Pressure Vessel and Pipeline Safety Program.

- Line-breaking policy
- Equipment inspection and maintenance
- Blocking, bleeding, and blanking
- Communication
- Training

Safe Driving Program.

- Inspection and maintenance
- Training

Ergonomic Program.

- Workstation evaluation
- Ergonomic injury tracking
- Ergonomic guidelines

8.7.4 Safety Training Programs

To ensure that employees recognize and understand how to protect themselves from potential hazards during this project, comprehensive safety training programs for construction and operation will be implemented as indicated in Tables 8.7-3 and 8.7-4, respectively. As indicated above, each safety procedure developed to control and mitigate potential site hazards will require some form of training. Training will be delivered in various ways, depending on the requirements of Cal-OSHA standards, the complexity of the topic, the characteristics of the workforce, and the degree of risk associated with each of the identified hazards.

8.7.5 Fire Protection

The EAEC fuel-handling system is described in Section 2.2.6. The basis for the design of the fire suppression system is provided in Section 2.3.2.1. Since the site is located in the far eastern corner of Alameda County (approximately 8 miles northwest of the city of Tracy and 12 miles east of Livermore) the closest fire station within Alameda County is Station 8 located at 1617 College Avenue, Livermore, California. The response time from this station to the proposed site is 20 minutes. Additional information regarding fire fighting assistance and support is located in Section 8.8 (Socioeconomics).

8.7.6 Laws, Ordinances, Regulations, and Standards

EAEC construction and operation will be conducted in accordance with all applicable LORS. Tables 8.7-5 through 8.7-8 summarize the LORS relating to worker health and safety.

TABLE 8.7-3
Construction Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Program/Plan	All
Personal Protective Equipment Training	All
Motor Vehicle and Heavy Equipment Safety Training	Employees working on, near, or with heavy equipment or vehicles
Forklift Operation Training	Employees operating forklifts
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Fall Protection Training	Employees working at heights greater than 6 feet or required to use fall protection
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Crane Safety Training	Employees supervising or performing crane operations
Fire Protection and Prevention Training	Employees responsible for the handling and storage of flammable or combustible liquids or gases
Hazard Communication Training	Employees handling or working with hazardous materials
Hot Work Safety Training	Employees performing hot work
Fire Prevention and Protection Training	Employees performing hot work
Electrical Safety Training	Employees performing LO/TO or working on systems that require LO/TO activities
Electrical Safety Training	Employees required to work on electrical systems and equipment, or use electrical equipment and cords
Permit-Required Confined Space Entry Training	Employees required to supervise or perform confined space entry activities
Hand and Portable Power Tool Safety Training	Employees that will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees that are exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising or driving motor vehicles
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Training	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All

TABLE 8.7-4
Operations Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Plan	All
Personal Protective Equipment Training	All
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Fall Protection Training	Employees required to use fall protection
Forklift Operator Training	Employees operating forklifts
Crane Safety Training	Employees supervising or performing crane operations
Fire Protection and Prevention Training	Employees responsible for the handling and storage of flammable or combustible liquids or gasses
Hot Work Safety Training	Employees performing hot work
Electrical Safety Training	Employees performing LO/TO
Electrical Safety	Employees required to work on electrical systems and equipment
Permit-Required Confined Space Entry	Employees required to supervise or perform confined space entry
Hand and Portable Power Tool Safety Training	Employees that will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising or driving motor vehicles
Hazard Communication Training	Employees handling or working around hazardous materials
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Program	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All

TABLE 8.7-5
Federal Laws, Ordinances, Regulations, and Standards Applicable to EAEC Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
Title 29 Code of Federal Regulations (CFR) Part 1910[a]	Contains the minimum occupational safety and health standards for general industry in the United States
Title 29 CFR Part 1926 [a]	Contains the minimum occupational safety and health standards for the construction industry in the United States

[a] Primary laws and regulations governing worker health and safety in California are provided in Table 8.7-6. These regulations are for reference and apply as referenced by California occupational safety and health regulations. Where a particular situation is not addressed by those regulations, the CFR will be consulted for guidance.

TABLE 8.7-6
State Laws, Ordinances, Regulations, and Standards Applicable to EAEC Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
California Occupational Safety and Health Act, 1970	Establishes minimum safety and health standards for construction and general industry operations in California
8 California Code of Regulations (CCR) 339	Requires list of hazardous chemicals relating to the Hazardous Substance Information and Training Act
8 CCR 450	Addresses hazards associated with pressurized vessels
8 CCR 750	Addresses hazards associated with high-pressure steam
8 CCR 1509	Addresses requirements for construction, accident, and prevention plans
8 CCR 1509, et seq., and 1684, et seq.	Addresses construction hazards, including head, hand, and foot injuries and noise and electrical shock
8 CCR 1528, et seq., and 3380, et seq.	Requirements for PPE
8 CCR 1597, et seq., and 1590, et seq.	Requirements addressing the hazards associated with traffic accidents and earth-moving
8 CCR 1604, et seq.	Requirements for construction hoist equipment
8 CCR 1620, et seq., and 1723, et seq.	Addresses miscellaneous hazards
8 CCR 1709, et seq.	Requirements for steel reinforcing, concrete pouring, and structural steel erection operations
8 CCR 1920, et seq.	Requirements for fire protection systems
8 CCR 2300, et seq., and 2320, et seq.	Requirements for addressing low-voltage electrical hazards
8 CCR 2395, et seq.	Addresses electrical installation requirements
8 CCR 2700, et seq.	Addresses high-voltage electrical hazards
8 CCR 3200, et seq., and 5139, et seq.	Requirements for control of hazardous substances
8 CCR 3203, et seq.	Requirements for operational accident prevention programs
8 CCR 3270, et seq., and 3209, et seq.	Requirements for evacuation plans and procedures
8 CCR 3301, et seq.	Requirements for addressing miscellaneous hazards, including hot pipes, hot surfaces, compressed air systems, relief valves, enclosed areas containing flammable or hazardous materials, rotation equipment, pipelines, and vehicle-loading dock operations.
8 CCR 3360, et seq.	Addresses requirements for sanitary conditions
8 CCR 3511, et seq., and 3555, et seq.	Requirements for addressing hazards associated with stationary engines, compressors, and portable, pneumatic, and electrically powered tools
8 CCR 3649, et seq., and 3700, et seq.	Requirements for addressing hazards associated with field vehicles
8 CCR 3940, et seq.	Requirements for addressing hazards associated with power transmission, compressed air, and gas equipment
8 CCR 5109, et seq.	Requirements for addressing construction accident and prevention programs
8 CCR 5110, et seq.	Requires employers to establish an ergonomic program
8 CCR 5139, et seq.	Requirements for addressing hazards associated with welding, sandblasting, grinding, and spray-coating

TABLE 8.7-6
State Laws, Ordinances, Regulations, and Standards Applicable to EAEC Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
8 CCR 5150, et seq.	Requirements for confined space entry
8 CCR 5160, et seq.	Requirements for addressing hot, flammable, poisonous, corrosive, and irritant substances
8 CCR 5192, et seq.	Requirements for conducting emergency response operations
8 CCR 5194, et seq.	Requirements for employee exposure to dusts, fumes, mists, vapors, and gases
8 CCR 5405, et seq.; 5426, et seq.; 5465, et seq.; 5500, et seq.; 5521, et seq.; 5545, et seq.; 5554, et seq.; 5565, et seq.; 5583, et seq.; and 5606, et seq.	Requirements for flammable liquids, gases, and vapors
8 CCR 5583, et seq.	Requirements for design, construction, and installation of venting, hiking, valving, and supports
8 CCR 6150, et seq.; 6151, et seq.; 6165, et seq.; 6170, et seq.; and 6175, et seq.	Provides fire protection requirements
24 CCR 3 et seq.	Incorporates current addition of Uniform Building Code
8 CCR, Part 6	Provides health and safety requirements for working with tanks and boilers
La Follette Bill (Health and Safety Code Section 25500, et seq.)	Requires that every new or modified facility that handles, treats, stores, or disposes of more than the threshold quantity of any of the listed acutely hazardous materials prepare and maintain an RMP
Health and Safety Code Sections 25500 through 25541	Requires the preparation of a Hazardous Material Business Plan that details emergency response plans for a hazardous materials emergency at the facility

TABLE 8.7-7
Local Laws, Ordinances, Regulations, and Standards Applicable to EAEC Worker Health and Safety

Law, Ordinance, Regulation, or Standard	Applicability
Required by Alameda County:	
• Specific hazardous material handling requirements	Provides response agencies with necessary information to address emergencies
• Emergency Response Plan	Allows response agency to integrate EAEC emergency response activities into any response actions
• Business Plan	Provides response agency with overview of EAEC purpose and operations
• Risk Management Plan (CUPA, administered by the County)	Provides response agency with detailed review of risks and hazards located at EAEC and mitigation implemented to control risks or hazards

TABLE 8.7-8
Applicable National Consensus Standard

Law, Ordinance, Regulation, or Standard	Applicability
Uniform Fire Code, Article 80	Addresses the prevention, control and mitigation of dangerous conditions related to storage, dispensing, use, and handling of hazardous materials and information needed by emergency response personnel
National Fire Protection Association (NFPA) 10, Standard for Portable Fire Extinguishers	Requirements for selection, placement, inspection, maintenance, and employee training for portable fire extinguishers
NFPA 11, Standard for Low Expansion Foam and Combined Agent Systems	Requirements for installation and use of low-expansion foam and combined agent systems
NFPA 11A, Standard for Medium and High Expansion Foam Systems	Requirements for installation and use of medium- and high-expansion foam systems
NFPA 12, Standard on Carbon Dioxide Extinguishing Systems	Requirements for installation and use of carbon dioxide extinguishing systems
NFPA 13, Standard for Installation of Sprinkler Systems	Guidelines for selection and installation of fire sprinkler systems
NFPA 13A, Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems	Guidance for inspection, testing, and maintenance of sprinkler systems
NFPA 14, Standard for the Installation of Standpipe and Hose Systems	Guidelines for selection and installation of standpipe and hose systems
NFPA 15, Standard for Water Spray Fixed Systems	Guidelines for selection and installation of water spray fixed systems
NFPA 17, Standard for Dry Chemical Extinguishing Systems	Guidance for selection and use of dry chemical extinguishing systems
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps	Guidance for selection and installation of centrifugal fire pumps
NFPA 22, Standard for Water Tanks for Private Fire Protection	Requirements for water tanks for private fire protection
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances	Requirements for private fire service mains and their appurtenances
NFPA 26, Recommended Practice for the Supervision of Valves Controlling Water Supplies	Supervision guidance for valves controlling water supplies
NFPA 30, Flammable and Combustible Liquid Code	Requirements for storage and use of flammable and combustible liquids
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	Fire protection requirements for installation and use of combustion engines and gas turbines
NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites	Fire protection requirements for hydrogen systems
NFPA 54, National Fuel Gas Code	Fire protection requirements for use of fuel gases
NFPA 59A, Standard for the Storage and Handling of Liquefied Petroleum Gases	Requirements for storage and handling of liquefied petroleum gases
NFPA 68, Guide for Explosion Venting	Guidance in design of facilities for explosion venting
NFPA 70, National Electric Code	Guidance on safe selection and design, installation, maintenance, and construction of electrical systems
NFPA 70B, Recommended Practice for Electrical Equipment Maintenance	Guidance on electrical equipment maintenance
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces	Employee safety requirements for working with electrical equipment
NFPA 71, Standard for the Installation, Maintenance,	Requirements for installation, maintenance, and use of

TABLE 8.7-8
Applicable National Consensus Standard

Law, Ordinance, Regulation, or Standard	Applicability
and Use of Central Station Signaling Systems	central station signaling systems
NFPA 72A, Standard for the Installation, Maintenance and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm and Supervisory Service	Requirements for installation, maintenance, and use of local protective signaling systems
NFPA 72E, Standard on Automatic Fire Detection	Requirements for automatic fire detection
NFPA 72F, Standard for the Installation, Maintenance and Use of Emergency Voice/Alarm of Communication Systems	Requirements for installation, maintenance, and use of emergency and alarm communications systems
NFPA 72H, Guide for Testing Procedures for Local, Auxiliary, Remote Station and Proprietary Protective Signaling Systems	Testing procedures for types of signaling systems anticipated for facility
NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment	Requirements for fire protection systems used to protect computer systems
NFPA 78, Lightning Protection Code	Lightning protection requirements
NFPA 80, Standard for Fire Doors and Windows	Requirements for fire doors and windows
NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems	Requirements for installation of air conditioning and ventilating systems
NFPA 101, Code for Safety to Life from Fire in Buildings and Structures	Requirements for design of means of exiting the facility
NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants	Guidelines for testing and marking of fire hydrants
NFPA 850, Recommended Practice for Fire Protection for Fossil Fuel Steam Electric Generating Plants	Requirements for fire protection in fossil-fuel steam electric generating plants
NFPA 1961, Standard for Fire Hose	Specifications for fire hoses
NFPA 1962, Standard for the Care, Maintenance, and Use of Fire Hose Including Connections and Nozzles	Requirements for care, maintenance, and use of fire hose
NFPA 1963, Standard for Screw Threads and Gaskets for Fire Hose Connections	Specifications for fire hose connections
American National Standards Institute/American Society for Mechanical Engineers (ANSI/ASME), Boiler and Pressure Vessel Code	Specifications and requirements for pressure vessels
ANSI, B31.2, Fuel Gas Piping	Specifications and requirements for fuel gas piping

8.7.7 Permitting Agencies and Schedule

Table 8.7-9 lists applicable permits related to the protection of worker health and safety for EAEC certification. The activities covered and application requirements to obtain each permit are provided.

All permits noted in Table 8.7-9 may be obtained from any Cal-OSHA district or field office as needed. Notification requirements are listed as 24 hours. Because the permits may be required at several points in the construction of the plant or during operations, no specific permitting schedule is provided.

TABLE 8.7-9
Health and Safety Permits for EAEC Worker Health and Safety

Permit	Issuing Agency	Application Requirements	Permit Procurement
Trenching and excavation permit	Any Cal-OSHA district or field office	Required for the following: • Trenches and excavations of more than 5 feet that personnel are required to enter • Construction of buildings, structures, scaffolding, or falsework more than 3 stories high • Demolition of any building or structure or dismantling of scaffolding or falsework more than 3 stories high	Submit completed permit application to any Cal-OSHA district or field office prior to commencing construction
Permit for the erection of a fixed tower crane	Any Cal-OSHA district or field office	Required for the erection, climbing, or dismantling of fixed tower cranes Notifications to Cal-OSHA must be made at least 24 hours prior to the initiation of the following activities: • Completion of erection and commencement of operation • Climbing of the tower crane • Dismantling of the tower crane	Submit completed permit application to any Cal-OSHA district or field office

8.7.8 Agency Contacts

Agency contacts relative to worker health and safety at EAEC are shown in Table 8.7-10.

TABLE 8.7-10
Agency Contacts for EAEC Worker Health and Safety

Agency	Contact	Title	Telephone
Office of Emergency Services – Alameda County	Duty Officer	Duty Officer	510/286-0895
Alameda County Environmental Health Department	Robert Weston or Ariu Levi	Hazardous Materials Specialist (notify in the event of a spill or hazardous materials release)	510/567-6700
Cal-OSHA – San Francisco District Office	John Tennison	Area Manager	415/972-8545 916/263-2800 (24-hour)

8.8 Socioeconomics

This section discusses the environmental setting, consequences, regional and local impacts, and mitigation measures associated with the socioeconomic aspects of the EAEC. Section 8.8.1 describes the environment that may be affected by EAEC construction and operation. Section 8.8.2 identifies environmental impacts from development of the power plant, and Section 8.8.3 discusses cumulative impacts. Mitigation measures are discussed in Section 8.8.4. Section 8.8.5 presents the LORs applicable to socioeconomics. Section 8.8.6 presents the agencies involved and provides agency contacts. Section 8.8.7 presents the required permits and permitting schedule. Section 8.8.8 provides references used to prepare this section.

8.8.1 Affected Environment

The EAEC project is located in the far eastern corner of Alameda County, within 1 mile of Contra Costa and San Joaquin counties. These three counties constitute the Region of Influence. These counties comprise two Metropolitan Statistical Areas (MSAs): the Oakland Primary Metropolitan Statistical Area (PMSA) and the Stockton MSA. Socioeconomic issues relevant to the affected environment include population, housing, employment, economic base and fiscal resources, public services, utilities, and schools.

The EAEC site, transmission line, water-, and gasline corridors cross the unincorporated area of all three counties. Land use in the vicinity is agricultural and open space, with relatively few residences (primarily farm houses). Economic activities/facilities are farming, the Western substation, a PG&E gas compressor station, the Department of Water Resources (DWR) water conveyance systems (California Aqueduct), and the U.S. Bureau of Reclamation's Delta-Mendota Canal.

8.8.1.1 Population

Alameda and Contra Costa counties are located in California's San Francisco Bay area and are part of the Association of Bay Area Governments (ABAG). These counties are generally highly urbanized. Incorporated cities in Alameda County include Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City. Incorporated cities in Contra Costa County include Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek. Incorporated cities in San Joaquin County include Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy.

Historical population data for these counties are summarized in Table 8.8-1. Annual average compounded population growth rates are summarized in Table 8.8-2. During the 1990s, Alameda County's population increased by 12.8 percent. Yet, its growth rate was the slowest of the three counties and less than the state average. Contra Costa County was one of the fastest growing counties in the area, yet its growth rate was less than the state average. San Joaquin County is the fastest growing of the three counties and one of the fastest growing in the state.

TABLE 8.8-1
Historical and Projected Populations[a]

Area	1990	1995	2000	2005 (p)	2010 (p)	2015(p)
Alameda County	1,284,800	1,347,700	1,470,200	1,571,800	1,654,500	1,718,000
Contra Costa County	807,600	867,300	931,900	981,900	1,025,900	1,061,200
San Joaquin County	483,800	524,600	579,700	647,300	725,900	800,700
3-County Total	2,576,200	2,739,600	2,981,800	3,201,000	3,406,300	3,579,900
California	29,942,400	32,062,900	34,653,400	37,372,400	39,957,600	45,448,600

Sources: Department of Finance (DOF), 1998.
[a]Populations rounded to nearest 100.
(p) projected

TABLE 8.8-2
Historical and Projected Annual Compounded Population Growth Rates

Area	1990-1995 %	1995-2000 %	2000-2005 %	2005-2010 %	2010-2015 %
Alameda County	0.96	1.76	1.35	1.03	0.76
Contra Costa County	1.44	1.45	1.05	0.88	0.68
San Joaquin County	1.63	2.02	2.23	2.32	1.98
3-County Total	1.24	1.71	1.43	1.25	1.0
California	1.38	1.57	1.52	1.35	2.61

Source: CH2M HILL, 2000.

8.8.1.2 Environmental Justice

President Clinton's Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed on February 11, 1994. The order required all federal agencies to develop environmental justice strategies. The U.S. Environmental Protection Agency (USEPA) subsequently issued Guidelines to assist all federal agencies and state agencies receiving federal funds, to develop strategies to address this problem. The agencies are required to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

Figures 8.8-1 and 8.8-2 show the ethnic and income distribution in the vicinity of EAEC, respectively. Data for both of these figures were taken from the 1990 U.S. Census data, as specified in the USEPA Guidelines (guidelines) for use in an environmental justice analysis (USEPA, 1996). The 2000 U.S. Census data are not expected to be available until April 2001.

According to the guidelines, a minority population exists if minorities comprise 50 percent or more of the affected area's general population. Figure 8.8-1 indicates that the minority population of the affected area is not greater than 50 percent of the general population. Thus, there are no potential minority population-based environmental justice issues in the EAEC area.

Because the guidelines do not give a percentage of the population as a threshold to determine the existence of a low-income population, the 50 percent rule required for minority populations was used here. Figure 8.8-2 indicates that the low-income population in the

affected area is not greater than 50 percent. Thus, there are no potential low-income population-based environmental justice issues in the EAEC area.

8.8.1.3 Housing

As shown in Table 8.8-3, housing stock for Alameda County as of January 1, 2000, was 536,495 units. Single-family homes accounted for 319,478 units, multiple family dwellings accounted for 210,057 units, and mobile homes accounted for 6,960 units. New housing authorizations for Alameda County in 1998 totaled 5,897 units; about two-thirds were single-family units and a third were multi-family units. These authorizations were valued at $1.26 billion (DOF, 2000). In November 1999, the median home price was $280,000. Alameda County's vacancy rate did not change significantly between 1990 and 1999 (from 5.0 percent to 4.9 percent). In January 2000, it was just above the federal housing standard of 5 percent.

As of January 1, 2000, the total housing stock for the three-county area was 1,080,481 units (DOF, 2000). Single family homes accounted for 716,884 units, multiple family dwellings accounted for 339,802 units, and mobile homes accounted for 23,795 units (see Table 8.8-3).

Any temporary need for housing can be met by the more than 14,000 hotel/motel rooms currently available in the three-county region.

TABLE 8.8-3
Housing Estimates by County, January 1, 2000

Area	Total Units	Single Family	Multi-family	Mobile Homes	% Vacant
Alameda County	536,495	319,478	210,057	6,960	5.01
Contra Costa County	353,983	259,279	87,115	7,589	5.09
San Joaquin County	190,003	13,8127	42,630	9,246	4.99
TOTAL	1,080,481	716,884	339,802	23,795	5.03

Source: DOF, 2000.

8.8.1.4 Economy

Alameda County is the local agency with taxing power. Alameda County is part of the state's busiest urban area. It has an established major port for the Pacific Rim trade, and its diverse economic base includes manufacturing, services, and wholesale and retail businesses. For FY 2001, Alameda County's Board of Supervisors approved an annual budget of about $1.6 billion.

The funding categories generally include the following County programs:

- General government: Board of Supervisors, Public Works Agency, County Administrator, County Counsel, Assessor, Treasurer-Tax Collector, Registrar of Voters, Human Resources Services, Information Technology Department, General Services Agency, Auditor-Control Recorder, County Library
- Public Protection: District Attorney, Fire Department, Sheriffs Department, Trial Court Funding, Community Development Agency
- Public Assistance: Administration and Finance, Department of Welfare to Work, Department of Workforce and Resource, Children and Family Services, Department of Adult and Aging Services, Probation Department, Public Defender
- Health Services: Public Health Department, Behavioral Health Services, Other Health

- Public Ways and Facilities: Administration, Nutrition Services, Welfare
- Cultural, Recreation, and Educational Services
- Capital Projects: Major Maintenance, Underground Tank Removal, and Hazardous Materials Management Projects
- Contingency Reserves
- Non-Program Financing

Table 8.8-4 shows how the funds were allocated. Table 8.8-5 shows funding revenues for the County in FY 1999, FY 2000, and FY 2001.

TABLE 8.8-4
Alameda County Budget Appropriations for FY 1999, FY 2000, and FY 2001 ($ Million)

Expenditures by Agency	FY 1998 (Final)	FY 1999 (Final)	FY 2000 (Final)
General Government	$86.4	$108.1	$111.0
Public Protection	$347.5	$378.9	$404.4
Public Assistance	$476.2	$466.9	$481.2
Health Care Services	$354.7	$365.8	$385.6
Public Ways and Facilities	$39.0	$37.9	$46.6
Cultural, Recreation, and Education Services	$15.7	$15.3	$17.4
Capital Projects	$46.3	$130.8	$103.5
Contingency Reserves	$3.0	$5.4	$9.3
Non-Program Financing			$23.0
Total Expenditures	**$1,368.8**	**$1,509.1**	**$1,582.0**

Source: County of Alameda, 2000.

TABLE 8.8-5
Alameda County Revenues, 1999 to 2001 ($ Million)

Revenues by Type	FY 1998 (Final)	FY 1999 (Final)	FY 2000 (Final)
Taxes – Current Property	$151.0	$164.7	$186.4
Taxes – Other than Current Property	$131.0	$134.5	$146.5
Licenses, Permits, Franchises	$4.9	$5.4	$5.6
Fines, Forfeitures, Penalties	$14.5	$14.9	$14.6
Revenue from Use of Money/Property	$9.5	$9.4	$9.6
Aid from State Government	$472.3	$461.2	$478.0
Aid from Federal Government	$237.5	$273.8	$307.5
Charges for Current Services	$144.3	$168.9	$175.0
Aid from Local Government Agencies	$4.1	$4.1	$5.9
Other Revenues	$68.3	$89.4	$82.7
Other Financing Sources	$122.2	$177.6	$163.6
Available Fund Balance	$9.2	$5.3	$6.8
Total Revenue	**$1,368.0**	**$1,509.0**	**$1,582.0**

Source: County of Alameda, 2000.

Alameda County's economy is based on the following (in order of importance): services, government, retail, and manufacturing (see Table 8.8-6). The Services sector is the largest sector in the county, accounting for 28 percent of the employment. Services is projected to

add 23,500 jobs by 2002 (California Employment Development Department (CEDD) Labor Market Information, 2000).

TABLE 8.8-6
Employment Distribution in Three-County Area, 1996 to 1999

	1996		1999		1996-1999	
Industry	Number of Employees	Employment Share (%)	Number of Employees	Employment Share (%)	Percentage Change	Average Annual Compound Growth Rate (%)
Agriculture, Mining	1,400	0	1,500	0	7	2.3
Construction	28,000	5	36,800	5	31	9.5
Manufacturing	88,700	14	93,400	14	5	1.7
Transportation, Utilities	38,700	6	44,200	6	14	4.5
Wholesale trade	43,700	7	55,300	8	27	8.2
Retail trade	96,200	15	102,800	15	7	2.2
Finance, Insurance and Real Estate	26,200	4	28,200	4	8	2.5
Services	175,200	28	195,700	29	12	3.8
Government	122,800	20	125,700	18	2	0.8
Total Employment	**620,900**	**100**	**683,600**	**100**	**10**	**3.3**

Sources: California CEDD, 1999.

Within the services industry, the concentration of growth is in business services and is influenced by the high-tech employment spreading from the Silicon Valley into southern Alameda County. Manufacturing is projected to add 13,200 jobs with industrial machinery and electronic equipment dominating the industry in growth. Retail trade is expected to add 10,600 jobs.

Between 1996 and 1999, employment in Alameda County increased by 62,700 jobs or about 10 percent. This 10 percent increase is greater than California's net increase (9 percent) during that same period. Construction and wholesale trade led the expansion. However, although construction and wholesale trade employment increased substantially between 1996 and 1999, the contribution by these sectors to the Alameda County economy remained relatively small.

Table 8.8-7 shows the employment distribution in the three-county region. The Services sector is the largest employer in the three-county region, accounting for 28 percent in 1996 and 29 percent in 1999. Government, retail, and manufacturing are also important sectors since they account for approximately 50 percent of the remaining employment in the region.

Between 1996 and 1999, employment in the three-county region increased by 112,200 jobs or about 10 percent. This 10 percent increase is above California's net increase (9 percent) during that same period. As in Alameda County, construction and wholesale trade led the expansion. However, the contribution by the construction and wholesale trade to the economy of the three-county region remained relatively small and constant between 1996 and 1999.

TABLE 8.8-7
Employment Distribution in the Three-County Area, 1996 to 1999

	1996		1999		1996-1999	
Industry	Number of Employees	Employment Share (%)	Number of Employees	Employment Share (%)	Percentage Change	Average Annual Compound Growth Rate (%)
Agriculture, Mining	20,400	2	24,600	2	21	6.4
Construction	53,200	5	71,700	6	35	10.5
Manufacturing	138,200	13	141,100	12	2	0.7
Transportation, Utilities	70,200	6	77,200	6	10	3.2
Wholesale trade	63,900	6	77,400	6	21	6.6
Retail trade	183,500	17	195,000	16	6	2.0
Finance, Insurance and Real Estate	60,500	6	65,600	5	8	2.7
Services	306,500	28	349,200	29	14	4.4
Government	201,700	18	208,500	17	3	1.1
Total Employment	1,098,100	100	1,210,300	100	10	**3.3**

Sources: California CEDD, 1999.
Numbers may not add due to independent rounding.

Table 8.8-8 provides more detail on the characteristics of the regional labor force. It shows 1999 employment data for the three counties compared to California. Both Alameda and Contra Costa counties have unemployment rates around 3 percent, both well below California's unemployment rate of 5.2 percent. San Joaquin County, however, exceeds the state unemployment level with a rate of 8.7. CEDD does not project unemployment rates but calculates prevailing unemployment rates.

TABLE 8.8-8
Employment Data by County, 1999

Area	Labor Force	Employment	Unemployment	Unemployment Rate (%)
Alameda County	722,200	697,400	24,800	3.4
Contra Costa County	489,300	474,500	14,800	3.0
San Joaquin County	252,900	230,800	22,100	8.7
California	16,585,900	15,721,700	864,200	5.2

Source: CEDD, 2000.

8.8.1.5 Project Construction

Actual construction will take place over approximately 26 months, from summer 2002 to summer 2004. Personnel requirements will be minimal during the mobilization and site grading period (i.e., during the first 3 months of the construction period) and during the startup and testing period (i.e., during the last 3 months of the construction period). The primary trades in demand will include boilermakers, carpenters, electricians, ironworkers, laborers, millwrights, operators, and pipefitters. Tables 8.8-9 and 8.8-10 estimate construction personnel requirements for the plant and linear facilities, respectively. Total construction personnel requirements during construction will be approximately 5,671

TABLE 8.8-9
Construction Personnel for Plant Construction by Month

	Months After Notice-to-Proceed																										
Discipline	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**Total**
Civil	10	30	30	45	30	20	20	20	10	10																	225
Structural						10	15	25	25	25	25	18	18	7													168
Mechanical, piping							10	18	30	45	90	102	102	120	120	120	112	112	80	80	38	38	20				1237
Mechanical, equipment					10	16	30	52	80	80	108	108	108	108	108	100	100	80	80	70	40						1278
Electrical, civil			18	22	22	28	22	22	12																		146
Electrical								5	11	20	20	44	44	78	82	82	82	82	82	44	44	30	4	6			760
Instrumentation													10	10	18	20	36	36	36	36	22	22	12	8			266
Misc (support labor)	2	2	2	6	6	6	6	18	18	18	22	22	22	22	22	22	22	22	22	22	18	10	10	4	4		350
Total Manual Staff	13	34	53	77	73	86	110	168	195	208	276	306	317	359	365	360	369	350	319	272	183	122	69	42	29	26	4781
Total Contractor Staff	3	3	6	14	14	20	20	30	30	35	35	35	35	35	35	35	30	30	30	20	20	15	15	15	7	5	572
Total Site Staff	**16**	**37**	**59**	**91**	**87**	**106**	**130**	**198**	**225**	**243**	**311**	**341**	**352**	**394**	**400**	**395**	**399**	**380**	**349**	**292**	**203**	**137**	**84**	**57**	**36**	**31**	**5353**

TABLE 8.8-10
Construction Personnel for Linear Facilities by Month

	Months After Notice-to-Proceed																									
Discipline	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**Total**
Water Pipeline/Pump Station																											
Civil								8	8	8	10	10	10														54
Structural								8	10																		18
Mech, piping									4	4	6	6	6														26
Mech, equip										8	4																12
Elec, civil									8	4	4																16
Electrical										4	4																8
Instrumentation										2	4																6
Misc (support labor)							1	2	6	6	4	2	2	1													24
Gas Pipeline																											
Civil											8	8	8														24
Structural											4																4
Mech, piping											4	4	4														12
Mech, equip												2															2
Elec, civil												2															2
Electrical													2														2
Instrumentation													2														2
Misc (support labor)										1	2	2	2	1													8
Transmission Lines																											
Civil										6	4																10
Structural										8	8																16
Mech, piping																											0
Mech, equip																											0
Elec, civil										2	4	8															14
Electrical												6															6
Instrumentation												2															2
Misc (support labor)									1	2	2	2	1														8
Total Manual Staff							1	18	37	55	72	54	37	2													276
Total Contractor Staff							2	2	6	8	8	6	6	4													42
Total Site Staff							**3**	**20**	**43**	**63**	**80**	**60**	**43**	**6**													**318**

person-months, or 472 person-years. Construction personnel requirements will peak at approximately 400 workers during months 11 to 18 of the construction period.

Available skilled labor in the three-county region was evaluated by surveying local labor unions (Table 8.8-11) and contacting the CEDD (Table 8.8-12). Both sources show that the workforce in Alameda County will be adequate to fulfill EAEC's labor requirements for construction. In addition, as shown in Table 8.8-13, the construction workforce within the three-county area has been growing at an average annual rate of 5 percent per year.

TABLE 8.8-11
Labor Union Contacts

Labor Union	Contact	Phone Number
Alameda Building Trades Council	Barry Luboviski	510/430-8664
Contra Costa Building Trades Council	Greg Feere	925/228-0900

It is expected that most of the construction labor force will be drawn from the local area and will commute daily less than 30 miles each way to reach the job site. Almost all of the work-force will commute 60 miles or less.

8.8.1.6 Plant Operation

The proposed EAEC facility is expected to begin commercial operation in 2004. It is expected to employ up to 40 full-time employees. For purposes of analysis, full-time employees are assumed to be 30. Anticipated job classifications are shown in Table 8.8-14. The entire permanent workforce is expected to commute from within the three-county region of influence.

8.8.1.7 Fiscal Resources

The EAEC initial capital cost is estimated to be $400 to 500 million; of this, materials and supplies are estimated at approximately $250 million. The estimated value of materials and supplies that will be purchased locally during construction is between $5 and $10 million. The total local sales tax expected to be generated during construction is $400,000 to $800,000 (i.e., 8.00 percent of local sales). EAEC will provide about $49 million in construction payroll, at an average salary of $50 per hour (including benefits).

TABLE 8.8-12
Available Labor by Skill in Alameda County, 1995 to 2002

Occupational Title	Annual Averages 1995	Annual Averages 2002	Absolute Change	Percentage Change	Average Annual Compounded Growth Rate (%)
Carpenters	3,360	3,790	430	12.8	1.73
Masons	1,460	1,690	230	15.8	2.1
Painters	1,380	1,470	90	6.5	0.91
Metal Workers	190	220	30	15.8	2.1
Electricians	2,050	2,220	170	8.3	1.14
Welders	1,290	1,450	160	12.4	1.68
Excavators	180	230	50	27.8	3.56
Graders	180	220	40	22.2	2.91
Industrial Truck Operators	5,720	5,580	-140	-2.4	-0.35
Operating Engineers	580	700	120	20.7	2.72
Helpers, Laborers	26,830	30,530	3,700	13.8	1.86
Pipefitters	1,180	1,280	100	8.5	1.17
Administrative Services Managers	1,550	1,700	150	9.7	1.33
Mechanical Engineers	1,370	1,790	420	30.7	3.89
Electrical Engineers	2,230	2,960	730	32.7	4.13
Engineering Technicians	6,660	7,740	1,080	16.2	2.17
Plant and System Operators	890	940	50	5.6	0.78

Source: CEDD, 2000.

TABLE 8.8-13
Available Labor by Skill in Three-County Area, 1995 to 2002

Occupational Title	Annual Averages 1995	Annual Averages 2002	Absolute Change	Percentage Change	Average Annual Compounded Growth Rate (%)
Carpenters	6,300	7,090	790	12.54	1.70
Masons	2,850	3,330	480	15.8	2.25
Painters	2,440	2,740	300	6.5	1.67
Metal Workers	310	350	40	4.6	1.75
Electricians	4,170	4,580	410	8.3	1.35
Welders	2,440	2,760	320	12.4	1.78
Excavators	420	520	100	27.8	3.10
Graders	450	530	80	22.2	2.37
Industrial Truck Operators	11,320	11,500	180	8.3	0.23
Operating Engineers	1,550	1,810	260	20.7	2.24
Helpers, Laborers	46,930	55,050	8,120	13.8	2.31
Pipefitters	2,340	2,630	290	8.5	1.68
Administrative Services Managers	2,820	3,150	330	9.7	1.59
Mechanical Engineers	1,970	2,490	520	30.7	3.40
Electrical Engineers	3,860	4,950	1,090	32.7	3.61
Engineering Technicians	10,170	11,800	1,630	16.2	2.15
Plant and System Operators	3,600	3,580	-20	11.1	-0.08

Source: CEDD, 2000.
Occupational titles in this table are similar, though not identical to, those in Tables 8.8-9 and 8.8-10 .

TABLE 8.8-14
Typical Plant Operation Workforce

Department	Personnel	Shift	Work days
Operations	16 Operating Technicians, 1 Chemical Technician	Rotating 12-hour shift, 3 operators per shift, 3 relief operators	7 days a week
Maintenance	7 Maintenance Technicians (3 Mechanical, 1 Electrical, and 3 Instrumentation)	Standard 8-hour days	5 days a week (Maintenance technicians will also work unscheduled days and hours as required [weekends])
Administration	7 Administrators (1, Plant Manager, 1 Operations Manager, 1 Maintenance Manager, 1 Office Manager, 1 Plant Administrator, 1 Procurement Specialist, and 1 Plant Engineer)	Standard 8-hour days	5 days a week with additional coverage as required

The annual operations budget is expected to be approximately $8 million, of which approximately $5 million will be spent locally. In addition, there will be an annual maintenance budget of approximately $9.5 million. Assuming an average operations salary of $57,000 per year, EAEC will spend $1.7 million in annual operations payroll.

EAEC is expected to bring both sales tax and property tax revenue to Alameda County. Although the California State Board of Equalization previously had jurisdiction over the valuation of a power-generating facility for property tax purposes, that responsibility has now shifted to the local authorities (Lai, 2001). In Alameda County, the County Assessor's Office is responsible for evaluating the market value of power-generating facilities. The Alameda County Assessor's Office uses a combination of three approaches (Evans, 2001) to assess the market value of a facility and thus assess the associated property taxes: (1) the cost approach (i.e., the cost to build EAEC until the point when it is operational, including entrepreneurial profits); (2) the income-generating approach (i.e., EAEC's anticipated income-generating capability over time); and (3) the market sales approach (i.e., the market price of similar plants/facilities). Since the property taxes are collected at the county level, their disbursement is also at the county level.

The basic countywide property tax rate of 1.0 percent, plus any existing bonds or special assessments (no greater than 1.3 percent), will be applied to the estimated valuation. If the facility is assessed at $500 million, the total property tax obligation will range from $5 to $6.5 million annually.

8.8.1.8 Public Services

This section describes public services in the project area.

Law Enforcement. The Alameda County Sheriff's Office is headquartered at 1401 Lakeside Drive in Oakland. The Patrol division is headquartered at 15001 Foothill Boulevard in San Leandro and serves all the unincorporated areas of Alameda. The Patrol division has 82 sworn patrol deputies, 79 civilian support personnel, 42 marked patrol cars, and other equipment including a state-of-the-art computer-aided dispatch system. The division receives and processes 9-1-1 calls for service and coordinates the response of the emergency

equipment and personnel. Two patrolmen are dedicated to the area near the EAEC site. The response time to an emergency call from the Mountain House/East Altamont area would be approximately 40 minutes (Gaudinier, 2000).

The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. Services include law enforcement, traffic control, accident investigation, and the management of hazardous materials spill incidents.

Fire Protection. The EAEC site is formally within the Alameda County Fire Department (ACFD) jurisdiction. ACFD Station No. 8 at 1617 College Avenue in Livermore is the nearest station to the EAEC site and will respond to a call from the site in approximately 20 minutes. Station No. 8 is staffed by four fire fighters and has one fire engine and a patrol truck. For a major structural fire, Station No. 8 relies on the assistance of Station No. 4, located at 20336 San Miguel Avenue in Castro Valley and the Livermore Lab (Lawrence Livermore National Laboratory), located on East Avenue in Livermore. The Livermore Lab has one engine and Station No. 4 can provide assistance with a water tender and two engines. Station No. 8 also has a mutual assistance agreement with the City of Tracy Fire Department located at 325 E. 10th Street in Tracy. The Tracy Fire Department can devote one engine with three firefighters to Station No. 8.

Two, 5 million-gallon (nominal capacity) onsite raw water storage tanks will be located at the project site. These tanks will include a minimum of 240,000 gallons of water dedicated to the fire protection system. The dedicated water supply is sized in accordance with NFPA 850 to provide 2 hours of protection from the onsite worst-case single fire.

Hazardous Materials. In the event of an emergency offsite release, plant personnel will defer to the county Haz Mat Team based at ACFD Station No. 4 in Castro Valley. Station No. 4 is staffed by six trained personnel and is able to manage hazardous materials emergencies, including incidents involving anhydrous ammonia (Maas, 2000). The response time to an emergency call from the EAEC site is 35 to 40 minutes.

Hospitals. There are 12 hospitals with emergency rooms in Alameda County. Eden Medical Center, located at 20103 Lake Chabot Road in Castro Valley, is a 275-bed, full-service, primary care medical facility. It is affiliated with Sutter Health, a northern California non-profit health system. Eden Medical Center includes Eden Hospital, Laurel Grove Hospital (an acute rehabilitation and transitional care center), and Baywood Court Skilled Nursing Facility. It has a staff of between 700 to 800. There are a number of physicians on staff and most of the physicians in the area have privileges at the medical center. Eden is the regional trauma center for Southern Alameda County and has an acute adult trauma center and a helipad. Specialty services at the hospital include Trauma Center, Level II; Acute Rehabilitation Center (at the Laurel Grove Hospital); High Risk Maternity Program; Cardiac Intensive Care Unit; Intensive Care Unit; and Neonatal Intensive Care Center. Eden acts as one of the referral centers for adult trauma in Alameda County.

Highland Hospital, located at 1411 East 31st Street in Oakland, has the other adult trauma center in Alameda County. It is a publicly owned, 200-bed, full-service, primary, secondary and tertiary care medical facility. It has a staff of about 1,900. It is a teaching institution and acts as the referral center for adult trauma in northern Alameda County. Specialty services include Trauma Center, Level II; Rehabilitation (at John George Hospital in Fairmont); High

Risk Maternity; Neonatal Intensive Care Center; Cardiac Intensive Care Center; and the Intensive Care Unit.

San Joaquin County Hospital, located at 500 West Hospital Rd. in French Camp, has an Emergency Room (ER) that handles all trauma (especially head traumas) cases for the southern and central part of San Joaquin County. San Joaquin County Hospital has yet to receive Trauma Center designation because it does not have an in-house Neurosurgeon. It is a publicly owned hospital with approximately 300 beds and has a helipad. It is a full service, primary, secondary, and tertiary medical care facility. Specialty services include a Long-term Rehabilitation; High Risk Maternity; Neonatal Intensive Care Center; and Intensive Care Unit.

8.8.1.9 Utilities

Electricity and Gas. Electrical power and natural gas in the region are provided by PG&E. The PG&E gas line (401) runs at an angle from west to south of the site. The power distribution line runs along the west side of the project site.

Water. The project is located in the service area of BBID, which has a pre-1914 water right for 60,000 acre-feet of water per year, of which BBID is currently using only about one-half. The water supply plan is described in Section 7.0.

Wastewater. The applicant would either construct a septic system and leachfield, or use a holding tank and transport sanitary wastes offsite for disposal. Process wastewater will be recycled and reused through use of a zero-liquid discharge treatment system, the waste stream of which will consist of a concentrated brine solution that will be discharged to onsite evaporation ponds.

Telephone. Pacific Bell provides telephone service to all of Alameda County. The main office is located in Sacramento.

8.8.1.10 Education

There are a total of 18 elementary and unified school districts in Alameda County. The EAEC site is in the Mountain House Elementary School District, though it borders the Tracy Unified School District in neighboring San Joaquin County. Students graduating from the eighth grade in Mountain House Elementary School attend West (Merril F.) High School in the City of Tracy (Tracy Unified School District). Current enrollment figures for both school districts for the 2000-01 school year are presented in Table 8.8-15. The Tracy Unified School District is in the process of updating its enrollment projections; therefore, projected enrollment information for 2001-02 is not yet available for the Tracy Unified School District. The schools in the Tracy Unified School District are currently considered over-crowded. (Fitzpatrick, 2000).

8.8.2 Environmental Consequences

This section assesses the potential environmental impacts of the project and linears.

8.8.2.1 Potential Environmental Impacts

Local environmental impacts were determined by comparing project demands during construction and operation with the socioeconomic resources of the project area (i.e., Alameda County as well as San Joaquin and Contra Costa counties). A proposed power generating facility could impact employment, population, housing, public services and utilities, and/or schools. Impacts could be local and/or regional, though most impacts would tend to be more regional than local. Regional consequences were determined by comparing project demands with the socioeconomic resources of Alameda County. It is anticipated that the project will not have any significant adverse impacts on the socio-economic environment, but it will have some minor benefits to the local community.

TABLE 8.8-15
Current and Projected Enrollment By Grade

	Mountain House Elementary School District		Tracy Unified School District	
Grade Level	**Current Enrollment (2000-01)**	**Projected Enrollment (2001-02)**	**Current Enrollment (2000-01)**	**Projected Enrollment[a] (2001-02)**
Kindergarten	4	2	988	
First	3	4	1,025	
Second	6	3	1,080	
Third	7	6	1,053	
Fourth	11	7	1,044	
Fifth	9	11	1,063	
Sixth	4	9	909	
Seventh	10	4	917	
Eighth	4	10	869	
Ninth			1,134	
Tenth			1,113	
Eleventh			1,003	
Twelfth			799	
Special Ed.			120	
TOTAL	**58**	**56**	**13,117**	

[a]Projected enrollment figures are not available at this time.
Source: Mountain House Elementary School District and Tracy Joint Unified School District, 2000.

8.8.2.2 Significance Criteria

The criteria used to determine the significance of project-related socioeconomic impacts are as suggested in the CEQA Checklist. Project-related impacts are determined to be significant if they:

- Induce substantial growth or concentration of population
- Displace a large number of people or existing housing

- Result in substantial adverse environmental impacts associated with the provision of utility services
- Result in substantial adverse physical impacts associated with the provision of public services
- Disrupt or divide the physical arrangement of an established community

Other impacts may be significant if they cause substantial change in community interaction patterns, social organization, social structures, or social institutions; substantial conflict with community attitudes, values, or perceptions; or substantial inequities in the distribution of project cost and benefit.

8.8.2.3 Population

It is not anticipated that the construction or operation of EAEC will contribute to an increase in the population of the area since workers are expected to commute . It is anticipated that most of the construction workforce will be drawn from the Castro Valley and Tri-Valley areas in Alameda County as well as Tracy in San Joaquin County. The remainder will come from surrounding Bay Area cities and suburbs.

8.8.2.4 Housing

The construction workforce will most likely commute to the project site daily; however, if needed, there are about 14,000 hotel/motel rooms in the three-county region available to accommodate workers who may choose to commute to the project site on a workweek basis. As a result, construction of the proposed project is not expected to increase the demand for housing.

8.8.2.5 Local Economy

The cost of materials and supplies (excluding the CTGs, HRSGs, and most other large equipment) required by the project is estimated at $250 million. The estimated value of materials and supplies that will be purchased locally during construction is $5 to $10 million.

The anticipated payroll for employees and cost of materials and supplies during construction will have a slight beneficial impact on the area. An average hourly wage of approximately $50 per hour (including benefits) is assumed for each construction worker. This will result in an estimated construction payroll of $49 million (2,080 hr/year *472 person-years*$50/hr). Assuming, conservatively, that 60 percent of the construction workforce will live in Alameda County, approximately $29.4 million can be anticipated to stay in the county. This additional expenditure in the community will generate a temporary beneficial impact by creating the potential for other employment opportunities for local workers within Alameda County in other areas of service (i.e., transportation, wholesale and retail trades, amusement, and other business services). In addition to the estimated payroll, the project could also create additional employment opportunities in the region through local expenditures for construction materials and services.

EAEC operation will generate a small, permanent beneficial impact by creating employment opportunities for local workers through local expenditures for materials, such as office

supplies and services. The average salary per operations employee is expected to be $57,000 a year. For the assumed average 30 (40 maximum) full-time employees, this will result in an operation payroll of $1.7 million per year. There will be an annual operations budget of approximately $8 million, $5 million of which is estimated to be spent locally. In addition, there will be an annual maintenance budget of approximately $9.5 million. These additional jobs and spending will generate other employment opportunities and spending in the Alameda County area.

8.8.2.6 Local Workforce during Construction

According to the CEDD and local unions (Tables 8.8-11 and 8.8-12), the workforce in the Bay Area will adequately fulfill the labor requirements for EAEC construction. Therefore, EAEC construction will not place an undue burden on the local workforce.

EAEC construction will have a small, positive benefit on the local unemployment rates. In 1999, employment in the three-county region was 1,464,400 persons, and the unemployment rate averaged approximately 4.2 percent. The addition of up to 400 temporary jobs will help maintain the low unemployment rate. The project could also create the need for additional jobs in other service areas, providing further temporary employment. Although the increased employment will be beneficial, it will not be significant.

The anticipated payroll for employees, as well as the purchase of materials and supplies during the construction period, will have a slight beneficial impact on the area. The total construction payroll is estimated at $49 million. Assuming, conservatively, that 60 percent of the construction workforce will reside in Alameda County, it is expected that approximately $29.4 million will stay in the local area. These additional funds will cause a temporary beneficial impact by creating the potential for other employment opportunities for local workers in other service areas, such as transportation and retail. In addition to the estimated construction payroll, the project could create additional temporary employment opportunities in the region as a result of the estimated $5 to $10 million spent locally for materials and services during construction. However, overall, the temporary socioeconomic impacts on the local economy during construction will not be significant.

8.8.2.7 Local Workforce during Operation

EAEC is assumed to employ approximately 30 (maximum of 40) full-time employees. Facility employees will be drawn from the local workforce and from existing Calpine staff. Consequently, no increase in population is anticipated as a result of this project. There will not be a significant impact on local employment. The plant workforce will likely reside within the three-county region.

8.8.2.8 Fiscal Resources

The effect on fiscal resources during construction will be from sales taxes realized on equipment and materials purchased in the county and from sales taxes from expenditures. The sales tax rate in Alameda County is currently 8 percent (as of January 1, 2001). Of this, 6 percent goes to the state; 1 percent goes to the place of sale; and 1 percent goes to the special districts (Allen, 2001). Assuming local expenditure of $5 million annually, the estimated sales taxes will be approximately $400,000. Of this amount, the state will receive approximately $300,000 ; the place of sale (city or county) and the district will each receive

approximately $50,000. The sales tax revenue realized during construction will have a positive benefit for the county, but because of its relatively small size, the impact will not be significant.

The county will not realize the $5 to $6.5 million in annual property tax revenue until construction is completed. Collected property taxes go to the state, where they are reallocated back to the cities, counties, and special districts. In Alameda County, 24.2 percent of the tax revenues is paid into the Education Revenue Augmentation Fund (ERAF), 19.9 percent is paid to cities, 19.5 percent goes to school districts, 17.8 percent is paid into the county general fund, 14.1, 3 percent goes to community colleges, and the remaining 1.6 percent is split between county libraries and the superintendent of schools (Lum, 2001). Therefore, approximately $890,000 ($5 million * 0.178) will be paid to Alameda County's general fund. This amount is too small, when compared to the $186 million in the County's 2001 property tax revenue, to be considered significant.

During operations, additional sales tax revenues will be obtained by the county and surrounding cities. Increased payroll will be $1.7 million annually, and additional O&M expenses will be approximately $17.5 million annually. Assuming local expenditures of $5 million annually, the estimated sales taxes will be $400,000. Of this amount, the place of sale (assumed to be the county) will receive $50,000 in sales tax revenue. The overall anticipated increase in sales and property tax revenue will be beneficial but not significant since it would constitute such a small percent of total county revenues.

8.8.2.9 Public Services and Utilities

Project construction and operation will not make significant demands on public services or facilities. However, the construction and operation phases of EAEC will have minor impacts on police, fire, or hazardous materials handling resources. Such impacts could include potential responses to emergency calls, routine site visits, and site plan approval from the fire department. However, these impacts are not considered significant, and existing resources are adequate to sustain them (Gaudinier, 2000; Farrughia, 2000; Maas, 2000; Bowman, 2000). Copies of the records of conversation with the Sheriff and Fire departments are included in Appendix 8.8.

EAEC construction and operation will not make significant adverse demands on local water, sanitary sewer, telephone, electricity, or natural gas. Impacts will involve the extension of existing utility lines. EAEC operation and construction also is not expected to create significant adverse impacts on medical resources in the area.

8.8.2.10 Education

As mentioned in Section 8.8.1.10, the Tracy Unified School District currently exceeds the District's planned capacity (Fitzpatrick, 2000). However, EAEC construction and operation will not cause significant population changes or housing impacts to the region. Most employees will commute to the site from areas within the three-county region, as opposed to relocating to the area. As a result, EAEC construction and operation is not expected to create any significant adverse impacts to the local school system. Although no adverse impacts are expected, industrial development within the Tracy Unified School District is currently charged a one-time assessment fee of $0.33 per square foot of principal building

area (Ohm, 2000). EAEC will pay this school impact fee. The Mountain House Elementary School District does not currently assess impact fees (Arjo, 2001).

8.8.3 Cumulative Impacts

According to the Alameda County Planning Department, no major on-going development projects are occurring within the county (Sawyer-Kubicek, 2000).

No major development projects are planned in Contra Costa in the project vicinity. The Contra Costa General Plan discusses the proposed development of the East County Airport and Los Vaqueros Reservoir as two major public works projects planned for future development in Eastern Contra Costa County. The proposed project in conjunction with these projects will not have a significant, cumulative socioeconomic impact. Construction of the Waterline Alternatives 3a, 3b, 3d or 3e in Contra Costa County would not have a significant, cumulative socioeconomic impact in conjunction with these projects to the county.

According to the San Joaquin County Planning Department, two major on-going projects in the general vicinity of the project site are taking place near Tracy (Sawyer-Kubicek, 2000). The Mountain House development project recently received its first permit for subdivision development, and completed buildout will result in a population of approximately 40,000 residents. The Patterson Pass Business Park is a major commercial development southwest of Tracy near Interstate-580 for which a special purpose plan has been prepared. The Business Park includes grocery warehouse operations and an auto auction facility. Development permits will be issued for the next few years for both projects.

Construction of the Mountain House subdivision would only have a few of the trades in common with EAEC, and construction of the subdivision would typically be done in phases. Because the size of the construction workforce is large; adverse cumulative impacts are not anticipated. Impacts to the schools are not anticipated from EAEC, but are likely from the Mountain House subdivision. However, the construction of additional school capacity should be part of the school's planning process for a subdivision of this size. In addition, payment of school impact fees by EAEC is, by statute, considered full mitigation for any potential school impacts. The installation of Waterline Alternatives 4a or 4b also would not have a significant, cumulative socioeconomic impact in the county.

8.8.4 Mitigation Measures

No significant impacts on socioeconomic resources were identified. Payment of school impact fees is considered full mitigation for any potential school impacts.

8.8.5 Laws, Ordinances, Regulations, and Standards

A summary of the LORS, including the project's conformance to them, is presented in Table 8.8-16.

8.8.5.1 Federal

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." The purpose of this Executive Order is to identify and address whether environmental impacts are likely to fall disproportionately on minority and/or low-income members of the community.

The federal guidelines set forth a two-step screening process:

1. Whether the potentially affected community includes minority and /or low-income populations; and
2. Whether the environmental impacts are likely to fall disproportionately on minority and/or low-income members of the community.

According to the guidelines established by USEPA to assist federal and state agencies to develop strategies to address this circumstance, a minority population exists if the minority population percentage of the affected area is 50 percent or more of the area's general population. As discussed in Section 8.8.1.2, the 1990 U.S. Census data indicate that the minority population on the project site and in the project vicinity does not exceed 50 percent. Therefore, the project would not cause disproportionate impact on minority populations.

TABLE 8.8-16
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Socioeconomics

LORS	Purpose	Applicability	Conformance (Section)
Federal			
Executive Order 12898	Avoid disproportionate impacts to minority and low-income members of the community	Not applicable since majority of the population in the project vicinity are not minorities or low-income members of the community.	Sections 8.8.5.1 and 8.8.1.1
State			
Government Code Section 65996	Establishes that the levy of a fee for construction of an industrial facility be considered mitigating impacts on school facilities	Tracy Unified School District may charge a one-time assessment fee to mitigate potential school impacts. Mountain House Elementary School District does not charge the one-time assessment fee.	8.8.2.10
Government Code Section 65302 et seq.	Requires each city and county to adopt a General Plan.	General Plan includes housing and open space elements.	8.8.1.2 addresses housing
Local			
Government Code Section 65996	Establishes that the levy of a fee for construction of an industrial facility be considered mitigating impacts on school facilities	State law described above is implemented at the local level.	8.8.2.10
Government Code Section 65302 et seq.	Requires each city and county to adopt a General Plan.	State law described above is implemented at the local level.	8.8.1.2 addresses housing

8.8.5.2 State

California Government Code Section 65996, through reference to Section 17620 of the Education Code, states that assessing an impact fee to construction within the school district's boundaries meets all mitigation requirements. The California State Planning Law, Government Code Sections 65302 et seq., as it applies to the housing element in the General

Plan (refer to the Section 8.8.5.3, Local) for the three counties in the project area, was considered. Since there are no housing impacts associated with the project, Government code Sections 65302 et seq., does not apply. In addition, an environmental document will be prepared to comply with CEQA. CEQA is invoked as a result of the land-use impacts generated from this project (refer to Section 8.4, Land Use). In addition, the preparation of this AFC complies with CEQA requirements.

8.8.5.3 Local

California State Planning Law, Government Code Sections 65302 et seq., requires that each city and county adopt a General Plan consisting of seven mandatory elements to guide its physical development. Section 65302(c) requires that a housing element be included in the General Plan, and Section 56302(e) requires an open space element. In addition, Section 65303(a) provides that optional elements also may be included in the General Plan. Most communities do not have LORs specifically affecting the socioeconomic aspects of a project. However, some communities assess impact fees (e.g., school impact fees) as part of the building permit process.

8.8.5.4 Codes

None is applicable.

8.8.6 Involved Agencies and Agency Contacts

Table 8.8-17 provides a list of agencies and contact persons.

TABLE 8.8-17
Agencies and Agency Contacts for EAEC Socioeconomics

Agency	Contact	Title	Phone Number
California State Board of Equalization	Esther Lai	Senior Property Auditor Appraiser	916/324-2969
California State Board of Equalization	Janet Allen	Tax Representative	510/622-4142
Mountain House Elementary School District	Dolores Kuhn	Secretary	209/835-2283
Alameda County Sheriff's Office	Charles Farrugghia Bill Gaudinier	Administrative Lieutenant Acting Adm. Lieutenant	510/667-3649 510/667-3649
Alameda County Fire Department	Jody Maas Bob Bowman Stanley Silva James Ferdinard	Battalion Chief Deputy Fire Marshall Battalion Chief, Battalion 2 Fire Marshall	510/670-5884 510/670-5853 510/670-5884 925/833-6606
Alameda County Office of Education	Allan Arjo	Director of Business Advisory Services	510/670-4276
Alameda County Office of the Assessor	Elizabeth Evans	Chief of Appraisal Division	510/272-3830
Alameda County Auditor Controller-Agency	Tom Lum	Tax Manager	510/272-6565
San Joaquin County Hospital	Mike Lime	Assistant Manager, Emergency Room	209/468-6000
Tracy Unified School District	Christine Fitzpatrick	Secretary to Director of Curriculum/Student Services	209/831-5028
West (Merril F.) High School	Barbara Claussen	Secretary to Principal	209/831-5430
Tracy Unified School District	Dolores Ohm	Facilities Technician	209/831-5032

8.8.7 Permits and Permitting Schedule

No permits are required for this section. Permits dealing with the affects on public services are addressed as part of the building permit process. These permits are addressed in Tables 8.4-3 and 8.4-4 in the Land Use section.

8.8.8 References

Allen, Janet. 2001. Tax Representative. California State Board of Equalization. Personal Communication. January 26.

Arjo, Allan. 2001. Director of Business Advisory Services, Alameda County Office of Education. Personal Communication. February 27.

Association of Bay Area Governments (ABAG). 1995. Projections 96: Forecasts for the San Francisco Bay Area to the Year 2015. December.

Bowman, Bob. 2000. Deputy Fire Marshall, Alameda County Fire Department. Personal Communication. November 9.

California Employment Development Department (CEDD). 1999. Internet sites: http://www.calmis.cahwnet.gov; http://www.calmis.cahwnet.gov/htmlfile/subject/COsnaps.htm

California Department of Finance (DOF). 2000. Financial and Economic data. California County Profiles. Internet site: www.dof.ca.gov\html\fs-data\profiles\pf-home.htm. December.

California Department of Finance (DOF). 1998. County Population Projections with Race/Ethnic Detail Estimated July 1, 1990-1996, Projections for 1997 through 2040. Internet site: http://www.dof.ca.gov/html/Demograph/Proj_race.htm

Claussen, Barbara. 2000. Secretary to Principal, West (Merril F.) High School, Tracy Unified School District. Personal Communication. November 13.

County of Alameda. 2000. Alameda County Budget for 1998-99, 1999-00 and 2000-01. Internet site: http://ww.co.alameda.ca.us/budget/index.shtml

Evans, Elizabeth. 2001. Chief of Appraisal Division. Alameda County Office of the Assessor. Personal Communication. January 26.

Farrugghia, Lieutenant Charles. 2000. Administrative Lieutenant, Alameda County Sheriff's Office. Personal communication. November 15.

Feere, Greg. 2000. Chief Executive Officer, Contra Costa Building Trades Council. Personal Communication and fax. November 30.

Fitzpatrick, Christine. 2000. Secretary to Rebecca Frame, Director of Curriculum/Student Services, Tracy Unified School District. Personal Communication. December 18.

Gaudinier, Lt. Bill. 2000. Acting Administrative Lieutenant, Alameda County Sheriffs Office. Personal Communication. November 28.

Kuhn, Dolores. 2000. Secretary, Mountain House Elementary School. Personal Communication. November 13.

Lai, Esther. 2001. Senior Property Auditor Appraiser, California State Board of Equalization. Personal Communication. January 26.

Luboviski, Barry. 2000. Secretary-Treasurer, Alameda Building Trades Council. Personal Communication. November 27.

Lum, Tom. 2001. Tax Manager, Alameda County Auditor Controller-Agency. Personal Communication. February 5.

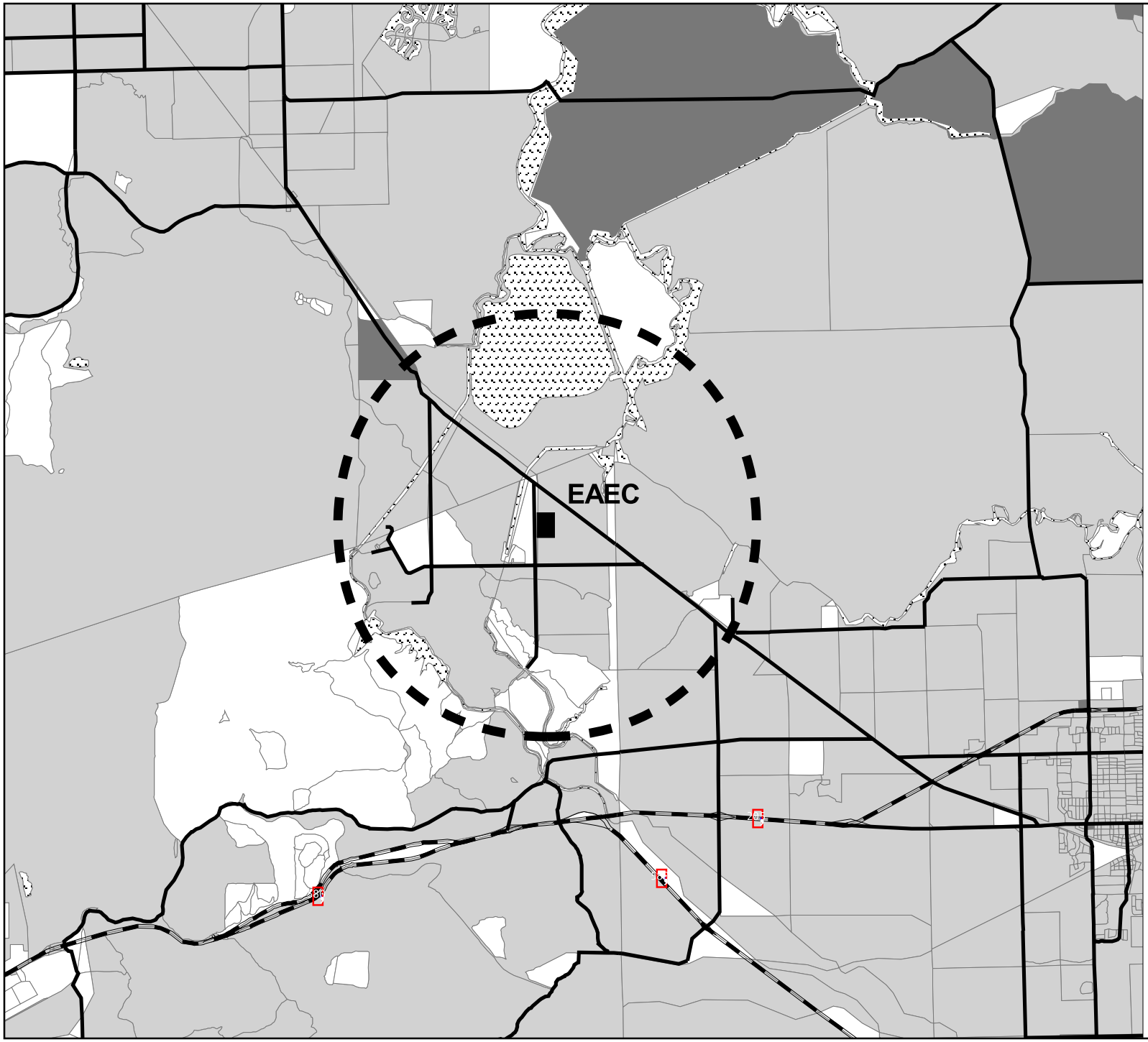
Maas, Jody. 2000. Chief of Station No. 4, Alameda County Fire Department. Personal Communication. November 13.

Ohm, Dolores. 2000. Facilities Technician, Facilities Department, Tracy Unified School District. Personal Communication. December 18.

Sawyer-Kubicek, Phillip. 2000. Personal Communication. Planner, Alameda County Planning Department. November 4.

Silva, Stanley. 2001. Battalion Chief, Battalion 2, Alameda County Fire Department, Castro Valley. Personal Communication. February 26.

United States Environmental Protection Agency (USEPA). 1996. Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses, July 12, 1996.



LEGEND

- 3 MILE RADIUS
- Water
- 0% to 50% Minority (by census block)
- 50% to 100% Minority (by census block)
- No Data

Source (US Census Data 1990)

N

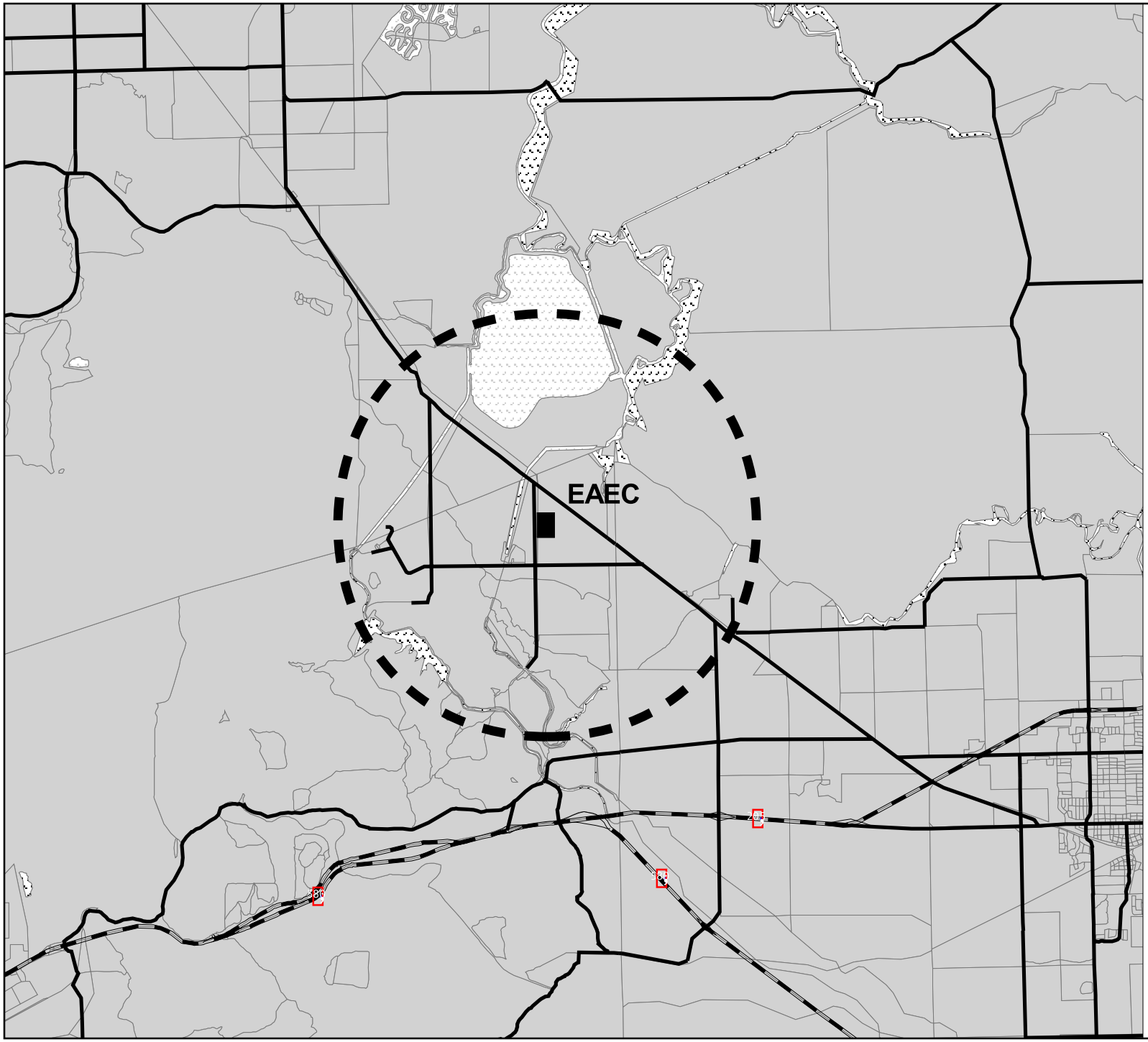
4000 0 4000 Feet

SCALE 1:124,000

FIGURE 8.8-1
ETHNIC DISTRIBUTION IN THE VICINITY OF EAEC

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL



LEGEND

- 3 MILE RADIUS
- Water
- 0% to 50% Below Poverty Income Level
- 50% to 100% Below Poverty Income Level
- No Data

Source (US Census Data 1990)

N

4000 0 4000 Feet

SCALE 1:124,000

FIGURE 8.8-2
INCOME DISTRIBUTION IN THE VICINITY OF EAEC

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

8.9 Agriculture and Soils

This section describes the environmental effects on agriculture and soils from the construction and operation of the project. Impacts are assessed for the EAEC site and for the natural gas supply, water supply, and electric transmission line corridors.

Section 8.9.1 describes the existing environment that could be affected, including agricultural use and soil types. Section 8.9.2 identifies environmental effects from project development, and Section 8.9.3 presents mitigation measures. Section 8.9.4 presents the LORS applicable to agriculture and soils. Section 8.9.5 describes the agencies involved and provides agency contacts. Section 8.9.6 describes required permits and the permit schedule. Section 8.9.7 provides the references used to develop this section.

8.9.1 Affected Environment

The EAEC site is located on a 174-acre parcel at the eastern edge of Alameda County, 8 miles northwest of the City of Tracy. The dominant land use in the area is agricultural production, comprising hay, alfalfa, tomatoes, and other row crops. These uses are interspersed with small residential areas, the Western electrical substation pump facilities, and roads. Gas, water, and electrical transmission lines serving the site cross similar land uses.

Information on types and distribution of soils within the project area was derived from published soil survey reports by the National Resource Conservation Service (NRCS) [formerly the Soil Conservation Service] and review of national soil data base information (NRCS, 2000). Soil types are characterized by soil map units that provide information on the soil series and phase. Soil series comprise soils exhibiting a common range of physical and chemical characteristics. Soil map units may contain soil inclusions that have different characteristics but which are too small to be represented on the landscape-level scale used for soil mapping (approximately 1 inch = 2,000 feet in this case). In developed or recently modified areas, soil maps may not represent current conditions.

Soil maps are useful for predicting general soil characteristics anticipated for a given area; however, they may not be definitive when interpreting conditions at a specific site. The soil survey maps for the project area shown on Figure 8.9-1, as well as descriptive information, are taken from three separate published soil surveys: *Soil Survey of Alameda County (*NRCS, 1966*), Full soil Survey of San Joaquin County (*NRCS, 1992*), and Soil Survey of Contra Costa County* (NRCS, 1977). Full soil descriptions are given on the Official Soil Descriptions (OSD) web page (NRCS, 2000).

Data for the affected environment are summarized and presented below:

- On Figure 8.9-2 the project linears are identified in this figure as waterlines, natural gaslines, and power transmission lines.
- Tables 8.9-1A and 8.9-1B summarize the characteristics of each of the individual soil mapping units identified on or near the project site boundaries or along the project's linear facilities. In addition to describing the parent material, landscape locations, and slopes, the table summarizes general physical properties including depth, texture, drainage, and permeability. Interpretations of the soil's water erosion hazard and

revegetation potential are also provided. Other interpretations on land capability classification (i.e., suitability for producing crops) are also presented.

- Figure 8.9-2 shows "Important Farmlands" as defined by the California Department of Conservation (CDC) (CDC, 1998). The minimum mapping unit size for the farmland mapping is 10 acres. The farmland mapping designated specific areas as follows: Prime Farmland (P); Farmland of Statewide Importance (S); Unique Farmland (U); Farmlands of Local Importance (L); Grazing Land (G); Urban and Built-Up Land (D); Other Land (X); and Water (W). In some cases, the mapped farmland designation encompasses several soil mapping units shown in Tables 8.9-1A and 8.9-1B.
- Soil series designated as "Prime Farmland" (or candidate) are also shown in Tables 8.9-1A and 8.9-1B.

8.9.1.1 Agricultural Use Around the Proposed EAEC Site

The types of land use surrounding the proposed project site are described and mapped in Section 8.4, Land Use. All 174 acres of the parcel are farmed as alfalfa-oats in rotation, or hay. Lands to the north, east, and south of the proposed site are used similarly, but the parcel directly west of the site is developed for industrial uses (Western electrical substation). As shown on Figure 8.9-2, all the land on the EAEC site is classified as prime farmland as is most of the surrounding area. Once developed, most of the land not required for project facilities, including the site and evaporation ponds, would be returned to agricultural production. Less than 55 acres of land designated as "prime" would be lost due to project construction and operation.

8.9.1.2 Agricultural Use Along Water and Gas Pipelines

The preferred and alternative water and gas pipelines were sited to minimize their length and disruption of roads and agricultural uses. Water and gas pipelines generally run along roads or in previously developed right-of-ways to minimize impacts to agriculture. Uses within the proposed corridor comprise pasture, row crops, hay, alfalfa, and vineyards. Generally, construction would consist of trenching, followed by restoration of the natural contours, soil replacement, and revegetation. If a water- or gasline crosses agricultural land, the land would be restored to agricultural production after the pipeline is installed. Nearly all the water and gas pipelines run adjacent to or within lands designated as of prime, statewide, or local importance.

8.9.1.3 Agricultural Use Along the Electrical Transmission Line

Short segments of electrical transmission line would need to be constructed to connect the project facility to the Western substation. There would be additional construction to connect the transmission lines from the substation to the project. Figure 2.1-1 shows the location of proposed transmission lines, crossing pasture and row crops off the project site. Up to 6 additional towers would be constructed in fields that are now used for agricultural production, resulting in a permanent loss of less than 0.5 acre of agricultural production.

TABLE 8.9-1A

Soil Mapping Units and Properties[a]

Map Symbol	Soil Series	Slope Class (%)	Parent Material	Landscape Locations	Soil Depth	Texture (Depth Range)
Aa	Altamont clay	C (3-15%)	Weathered fine-grain sandstone and shale	Gently sloping to steep uplands	Moderately deep to deep	*Clay (0-28 in.)* *Clay, silty clay, clay loam (28-50 in.)* *Weathered rock (>50 in.)*
La	Linne clay loam	C (3-15%) D(15-30%)	Weathered fairly soft shale and sandstone	On hills	Shallow to moderately deep	*Clay loam (0-29 in.)* *Sandy clay loam, fine sandy loam (29-36 in.)* *Mudstone (36-51 in.)*
Pd	Pescadero clay	(0-2%)	Alluvium from sedimentary rocks	In basins	Very deep	*Clay loam (0-2 in.)* *Clay, silty clay (2-30 in.)* *Clay loam, silty clay loam (30-60+in.)*
Rc	Rincon loam	(0-3%)	Alluvium from sandstone and shale	Nearly level valley bottoms and fans	Deep	*Loam (0-16 in.)* *Sandy clay, clay, clay loam (16-52 in.)* *Sandy loam, clay loam (52-60+in.)*
Rd	Rincon clay loam	A (0-3%) B (3-7%)	Alluvium from sedimentary rocks	On old alluvial fans; stream and marine terraces	Deep	*Clay loam (0-16 in.)* *Sandy clay, clay, clay loam (16-52 in.)* *Sandy loam, clay loam (52-60+in.)*
Sa	San Ysidro loam	0-9%	Alluvium from sedimentary rocks	Nearly level old valley fill	Deep	*Fine sandy loam (0-14 n.)* *Clay, sandy clay loam (14-40 in.)* *Sandy clay loam (40-68 in.)*
Sf	Solano fine sandy loam	Nearly level	Alluvium from sandstone and shale	Nearly level terraces and basins	Deep	*Loam (0-9 in.)* *Clay loam, silty clay loam (9-62 in.)*
Bb	Brentwood clay loam	0-2%	Alluvium from sedimentary rocks	Nearly level to gently sloping fans on valley fill	Deep	Clay loam (0-60+in.)
Fc	Fluvaquents	---	Mixed Alluvium from sedimentary rocks	In sloughs or river channels	---	Too variable to estimate
Lb	Linne clay loam	D (5-15%)	Weathered fairly soft shale and sandstone	On lower foothills	Moderately deep	Clay loam (0-29 in.) Shale (>29 in.)
Mb	Marcuse clay	< 1%	Alluvium from sedimentary rocks	On lower edges of valley fill and rims of basins	Deep	Sand (0-20 in.) Clay (20-60+in.)
Sa	Sacramento Clay	0-2%	Mixed alluvium	Nearly level basins at or near sea level	Deep	Clay (0-60+in.)
Sc	San Ysidro loam	0-2%	Alluvium from sedimentary rocks	Old alluvial fans and valley floors	Very deep	Loam (0-15 in.) Silty clay, clay (15-54 in.) Silty clay loam (54-80 in.)
Sh	Solano loam	0-2%	Alluvium from sedimentary rocks	Basin rims of old valley fill	Deep	Loam, clay loam (0-9 in.) Clay loam, silty clay loam (9-60+in.)
118	Capay clay	0-2%	Alluvium from mixed rock sources	Interfan basins	Deep	Clay, silty clay (0-20 in.) Clay (20-60+in.)
153	Egbert silty clay loam	0-2%	Alluvium from mixed rock sources	On flood plains	Very deep	Silty clay loam, silty clay (0-8 in.) Mottled clay (8-19 in.) Clay, clay loam (19-60+in.)
166	Grangeville fine sandy loam	0-2%	Alluvium from granitic rocks	On flood plains	Very deep	Fine sandy loam, sandy loam, loam (0-20 in.) Fine sand, silt loam, fine sandy loam (20-60+in.)
197	Merritt silty clay loam partially drained	0-2%	Alluvium from mixed rock sources	On flood plains	Very deep	Silty clay loam, loam, silt loam (0-17 in.) Silt loam, silty clay loam (17-32 in.) F- sandy loam (32-60+in.)
211	Pescadero clay loam partially drained	0-2%	Alluvium from sedimentary rocks	In basins	Very deep	Clay loam, silty clay loam (0-10 in.) Silty clay (10-42 in.) Silty clay loam (42-60+in.)

TABLE 8.9-1A

Soil Mapping Units and Properties[a]

Map Symbol	Soil Series	Slope Class (%)	Parent Material	Landscape Locations	Soil Depth	Texture (Depth Range)
223	Reiff loam	0-2%	Alluvium from mixed rock sources	On alluvial fans	Very deep	Loam, sandy loam (0-7 in.) F-sandy loam, loamy (f) sand (7-55 in.) Loam (55-60 in.+)
252	Stomar clay loam	0-2%	Alluvium from sedimentary rocks	On alluvial fans	Very deep	Clay loam, silty clay loam, loam (0-17 in.) Clay loam, clay (17-47 in.) Clay loam (47-60+in.)
253	Stomar clay loam, wet	0-2%	Alluvium from sedimentary rocks	On alluvial fans	Very deep	Clay loam, silty clay loam (0-17 in.) Clay loam, clay (17-47 in.) Clay loam (47-60+in.)
268	Vernalis clay loam	0-2%	Alluvium from mixed rock sources	On alluvial fans	Very deep	Clay loam, silty clay loam (0-9 in.) Clay loam, loam (9-47 in.) F-sandy loam (47-60+in.)
274	Willows clay, partially drained	0-2%	Alluvium from mixed rock sources	In basins	Very deep	Clay, silty clay (0-20 in.) Clay (20-60+in.)

[a] All data derived from NRCS publications (NRCS, 1966; 1977, 1981, and 1992) and reports including Official Series Descriptions (OSDs)(NRCS, 2000).

[b] Shallow soil over bedrock may limit normal excavation and trenching operations.

--- Indicates these data were not in the information reviewed. Italicized entry indicates that the information for the soil map unit was derived indirectly from a soil survey from an adjacent county or the OSD data.

TABLE 8.9-1B

Soil Mapping Units and Properties[a]

Map Symbol	Drainage	Permeability	Water Erosion Hazard	Revegetation Potential	Storie Index	Land Capability	Soil Map Units within Farmland Resource Type	Prime Farmland?
Aa	Well drained	Slow	Slight	Very Good	---	IIIe-5	G	N
La	Well drained	Moderately slow	Slight to moderate Moderate	Very Good	---	IIIe-5 IVe-5	S, P, G	N
Pd	Poorly drained	Very slow	Slight	Very Poor	---	Viw-2	X, U, D	N
Rc	Well drained	Slow	Slight	Good	---	IIs-3	S	Y
Rd	Well drained	Slow	Slight Slight to moderate	Very Good	---	*IIIs-3 (NI);* IIs-3 *(I)* IIIe-3	P, X	Y
Sa	Moderately well drained	Very slow	Slight	Fair	---	IVe-3	G	Y
Sf	Somewhat poorly drained	Very slow	Slight	Very Poor	---	VIw-2	G, D	N
Bb	Well drained	Moderately slow	None	Good	81	I(17)	U	N
Fc	Very poorly drained	---	---	Very Poor	<10	VIIIw-1(16)	X	N
Lb	Well drained	Moderately slow	Slight to moderate	Good	43	IIIe-5(15)	L	N
Mb	Very poorly and poorly drained	Slow	None	Very Poor	16	IVw-6(17)	X, U	Y
Sa	Poorly drained	Slow	None	Good	49	IIIw-5(16)	P	N
Sc	Moderately well drained	Very slow	Slight	Fair	43	IIIs-3(17)	U	N
Sh	Somewhat poorly drained	Very slow	Slight	Very Poor	23	IVw-6(17)	L, U	N
118	Moderately well drained	Slow	Slight	Good	44	IIs-5(17) (I) IVs-5(17) (NI)	P	Y
153	Poorly drained	Slow	Slight	Good	58	IIw-2(17) (I) IVw-2(17) (NI)	---	Y
166	Somewhat poorly drained	Moderately rapid	Slight	Good	76	IIw-2(17) (I) IVw-2(17) (NI)	---	Y
197	Poorly drained	Moderately slow	Slight	Good	68	IIw-2(17) (I) IVw-2(17) (NI)	---	Y
211	Poorly drained	Very slow	Slight	Fair	10	IIIw-6(17) (I) IVw-6(17) (NI)	---	N
223	Well drained	Moderately rapid	Slight	Good	90	IIs-0(17) (I) IVs-0(17) (NI)	L	Y
252	Well drained	Slow	Slight	Good	68	IIs-3(17) (I) IVs-3(17) (NI)	P, L	Y
253	Well drained	Slow	Slight	Good	61	IIw-3(17) (I) IVw-3(17) (NI)	---	Y
268	Well drained	Moderate	Slight	Good	85	I(17) (I) IVc-1(17)	P	Y
274	Poorly drained	Very slow	Slight	Fair	27	IIIw-6(17) (I) IVw-6(17) (NI)	---	N

[a] All data derived from NRCS publications (NRCS, 1966; 1977, 1981, and 1992) and reports including Official Series Descriptions (OSDs)(NRCS, 2000).

[b] Shallow soil over bedrock may limit normal excavation and trenching operations.

--- Indicates that these data were not in the information reviewed. Italicized entry indicates that the information for the soil map unit was derived indirectly from a soil survey from an adjacent county or the OSD data.

8.9.1.4 Soil Types Affected

Alameda County.

AaC—Altamont Clay, 3 to 15 Percent Slopes. The well-drained Altamont soils are formed from weathered interbedded shale and fine-grained sandstone on gently sloping to steep uplands. Surface soil is dark-brown, very hard, neutral to mildly alkaline clay. Depth to bedrock ranges from 18 to 60 inches (moderately deep to deep). Water erosion hazard is slight and runoff is medium. Shrink-swell potential is high. It is commonly used for dry-farmed grain and grain hay.

LaC—Linne Clay Loam, 3 to 15 Percent Slopes. This well-drained soil is formed on hills from soft calcareous shale and fine-grained sandstone. Depth to bedrock ranges from 12 to 50 inches (shallow to moderately deep). Water erosion hazard is slight to moderate and runoff is slow to medium. Shrink-swell potential is moderate. It is used for dry-farmed grain and grain hay. The occurrence of shallow soils could increase the costs of excavation for linear features but this condition is anticipated to be limited in the project area.

LaD—Linne Clay Loam, 15 to 30 Percent Slopes. This calcareous soil occurs on smooth, moderately steep uplands. The texture ranges from loam to silty clay. This well-drained soil has moderately slow permeability, runoff is medium, and water holding capacity is moderate. Fertility is high, and erosion hazard is moderate. It is used for dry-farmed grain, grain hay, pasture, and range.

Pd—Pescadero Clay. The poorly drained Pescadero soils are formed in basins from alluvium derived from sedimentary rocks. The surface layer is thin, gray slightly acid clay loam that has a platy structure. This soil is imperfectly drained and is very slowly permeable. Water erosion hazard is slight. Runoff is slow and water-holding capacity is low. Shrink-swell potential is moderate to high. This soil can be cultivated only within a narrow range of moisture content. Fertility is low and cultivation is difficult. This soil mainly supports pasture.

RdA—Rincon Clay Loam, 0 to 3 Percent Slopes. This well-drained soil is formed in alluvium from sandstone and shale on nearly level valley bottoms and fans. The soil has a slowly permeable subsoil. Runoff is slow and available water-holding capacity is high. Water erosion hazard is slight. Shrink-swell potential is moderate to high. This soil is somewhat difficult to work with and used commonly for irrigated alfalfa and pasture.

Rd B—Rincon Clay Loam, 3 to 7 Percent Slopes. This soil is similar to Rincon clay loam, but occurs on gently sloping fans. Runoff is slow to medium and erosion hazard is slight to moderate. This soil is mainly used for dry-farmed grain.

Mb—Marcuse Clay. This poorly drained soil is formed from alluvium on lower edges of valley fill or rims of basins. The soil unit is subject to ponding. It includes some areas of strongly alkaline soils, and slopes of less than 2 percent. Surface layers (up to 20 inches thick) tend to be sandy or loamy. There is no hazard of erosion. Shrink-swell potential in the clay subsurface layer is high. About 5 to 35 percent of the mapping unit is unsuited to most crops because of saline-alkaline salts, though the remainder is used for irrigated pasture or row crops.

Sa—San Ysidro Loam (in Alameda County). San Ysidro soils are formed in alluvium from sedimentary rock and are located on old alluvial fans and valley floors. Surface layers tend to be pale brown to grayish brown silt loam or fine sandy loam. Permeability is very slow and available water capacity is low. Runoff is slow and erosion hazard is slight. Shrink-swell potential is high in the subsurface layer. This soil is mainly used for dry-farmed grain, grain hay, pasture, and range.

Sf, Sh—Solano Fine Sandy Loam or Loam. This somewhat poorly drained soil was formed in alluvium from sandstone and shale on nearly level terraces and within basins. It is severely affected by sodium salts. Permeability is very slow and available water capacity is 4 to 6 inches. This old valley fill near the rims of basins has slopes of 0 to 2 percent. Runoff is slow and erosion hazard is slight. Shrink-swell potential is high in the subsurface layers below 9 inches. This soil is used mainly for range and in limited cases, for irrigated pasture.

Contra Costa County.

Bb—Brentwood Clay Loam. This well-drained soil is on valley fill, occurring on slopes of 0 to 2 percent. Surface layer is brown, grayish-brown clay loam or silty clay loam; neutral to moderately alkaline. It is well drained, runoff is slow, and there is no hazard of water erosion. Available water capacity is 10 to 12 inches. Shrink-swell potential is high. This soil is used for tomatoes, sugar beets, head lettuce, barley, and alfalfa.

Fc—Fluvaquents. This very poorly drained, loamy mineral soil occurs in sloughs and river channels. It is stratified fine sandy loam, sandy loam, loam, silt loam, and silty clay loam, with lenses of organic material. Fluvaquents are subject to frequent flooding or inundation. Typical vegetation is tules, reeds, willows and other hydrophytic plants. The use of this soil type is generally limited to wildlife habitat.

LbD—Linne Clay Loam, 5 to 15 Percent Slopes. The Linne series are well-drained soils underlain by calcareous, interbedded shale and soft sandstone. The surface layer is gray calcareous clay loam about 29 inches thick. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. This soil is used for dryland grain, chiefly barley, and for range.

Sa—Sacramento Clay. The Sacramento soils consist of poorly drained and very poorly drained soils that formed in mixed alluvium, adjacent to organic soils in the Sacramento-San Joaquin Delta, on slopes of 0 to 2 percent. The surface layers can be as deep as 41 inches, comprising very dark gray, slightly acid clay in the top 9 inches. Permeability is slow and available water-holding capacity is 5 to 9 inches. Runoff from these soils is slow, and there is no hazard of erosion. The soil is mainly used for irrigated pasture.

Sc—San Ysidro Loam. The moderately well-drained San Ysidro soils are formed on old alluvial fans and valley floors from alluvium derived from sedimentary rock. Surface layers tend to be light brownish-gray, slightly acid loam. Permeability is very slow and available water capacity is 3.5 to 5 inches. This is the only San Ysidro soil mapped in the county and occurs on slopes of 0 to 2 percent. Runoff is slow and erosion hazard is slight. Shrink-swell potential is high below the loamy surface layer. This soil is mainly used for range, although some areas are used for barley or irrigated pasture.

Sh—Solano Loam. This somewhat poorly drained soil was formed in alluvium from sedimentary rock. It is severely affected by sodium salts. Permeability is very slow and available water capacity is 4 to 6 inches. This old valley fill near the rims of basins has slopes of 0 to 2 percent. Runoff is slow and water erosion hazard is slight. Shrink-swell potential is high. This soil is used mainly for range and in a few limited cases for irrigated pasture.

San Joaquin County.

118—Capay Clay, 0 to 2 Percent Slopes. This very deep, moderately well drained soil is in interfan basins, and is formed in alluvium derived from mixed rock sources. The surface layer is grayish brown to dark grayish brown clay. Permeability is slow, and available water capacity is high. Runoff is slow and water erosion hazard is slight. Shrink-swell potential is high. Most areas of this mapping unit are used for irrigated crops or orchards.

153—Egbert Silty Clay Loam, Partially Rained 0 to 2 Percent Slopes. This deep, poorly drained, nearly level soil is on flood plains. It formed in alluvium derived from mixed rock sources. The upper 8 inches of the surface are gray silty clay loam. Permeability is slow and water capacity is very high. Runoff is slow and water erosion hazard is slight. Shrink-swell potential is moderate to high. Most areas of this mapping unit are used for irrigated crops or used for homesite development.

166—Grangeville Fine Sandy Loam, Partially Drained, 0 to 2 Percent Slopes. This very deep, somewhat poorly drained level soil is on flood plains. It formed in alluvium derived from granitic rock sources. Typically, the surface layer is grayish brown fine sandy loam about 20 inches thick. Permeability is moderately rapid, and available water capacity is moderate. Runoff is slow, and the hazard of water erosion is slight. Hazard of soil blowing is slight. Most areas in this mapping unit are used for irrigated crops. This unit may also provide wetland functions and values and should be considered in plans for wildlife habitat enhancement.

197—Merritt Silty Clay Loam, Partially Drained, 0 to 2 Percent Slopes. This very deep, somewhat poorly drained level soil is on flood plains, formed in alluvium derived from mixed rock sources. Typically the surface layer is grayish brown and dark gray silty clay loam about 17 inches thick. Permeability is moderately slow, and water capacity is high. Runoff is slow and hazard of water erosion is slight. The soil is subject to rare flooding, which occurs during years of abnormally high precipitation. Most areas in this mapping unit are used for irrigated crops.

211—Pescadero Clay Loam, Partially Drained, 0 to 2 Percent Slopes. This very deep, poorly drained, nearly level, saline-sodic soil is in basins. It formed in alluvium derived from sedimentary rock sources. The surface layer is typically grayish brown clay loam about 10 inches thick. Permeability is very slow; water capacity is moderate. Runoff is very slow and hazard of water erosion is slight. Shrink-swell potential is moderate to high. Most areas in this mapping unit are used for irrigated agriculture.

223—Reiff Loam, 0 to 2 Percent Slopes. This very deep, well-drained, nearly level soil is formed on fans in alluvium from mixed rock sources. Typically, the surface layer is grayish brown loam about 7 inches thick. Permeability is moderately rapid, and available water capacity is moderate. Water erosion hazard is slight. Shrink–swell potential is low. Most

areas of this unit are used for irrigated crops or orchards. A few areas are used for dryland grain crops or homesites.

252—Stomar Clay Loam, 0 to 2 Percent Slopes. This very deep, well-drained, nearly level soil is on alluvial fans. It formed in alluvium derived from sedimentary rock sources. Typically the surface layer is grayish brown clay loam about 17 inches thick. Permeability is slow; available water capacity is very high. Water erosion hazard is slight. Shrink-swell potential is moderate to high. Most areas are used for irrigated crops or orchards.

253—Stomar Clay Loam Wet, 0 to 2 Percent Slopes. This very deep, well-drained, nearly level soil is on alluvial fans. It formed in alluvium derived from sedimentary rock sources. Typically the surface layer is grayish brown clay loam about 17 inches thick. Permeability is slow; available water capacity is high. Shrink-swell potential is moderate to high. Water erosion hazard is slight. Most areas are used for irrigated crops or orchards.

268—Vernalis Clay Loam, 0 to 2 Percent Slopes. This very deep, well-drained, nearly level soil is on alluvial fans. It was formed in alluvium derived from mixed rock sources. Typically, the surface layer is brown clay loam about 9 inches thick. Permeability is moderate, and available water capacity is high. Runoff is slow and water erosion hazard is slight. Shrink-swell potential is moderate. Most areas of this unit are used for irrigated crops or orchards. A few areas are used for dryland grain crops or homesites.

274—Willows Clay, Partially Drained, 0 to 2 Percent Slopes. This very deep, poorly drained, nearly level, saline-sodic soil is in basins. It formed in alluvium derived from sedimentary rock sources. The surface layer is gray clay about 20 inches thick. Permeability is very slow; water capacity is moderate. Runoff is slow and hazard of water erosion is slight. Shrink-swell potential is high. Most areas in this mapping unit are used for irrigated agriculture, and a few are used for homesite development.

8.9.1.5 Prime Farmlands

The designations of Important Farmlands in the project vicinity are shown on Figure 8.9-2 (CDC, 1998). This map is derived from information provided from the Farmland Mapping and Monitoring Program (FMMP) administered by the Division of Land Resource Protection in the California Department of Conservation.

The designation of prime farmland is also considered with respect to specific soil mapping units as indicated in the NRCS soil surveys. The NRCS defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

The Important Farmland Map (Figure 8.9-2) shows that a majority of the project area is considered as Prime Farmland (P), Farmlands of Statewide Importance (S), Unique Farmlands (U), or Farmlands of Local Significance (L). The most notable exceptions to this are the Grazing lands (G) in the western portion of the project area and Urban and Built-up lands (D), or Other Lands (X) along the Delta-Mendota Canal and the area around the Tracy substation.

All of the project site, and most of the project linears, is either on or adjacent to farmlands identified as Prime. In real terms, construction of the project would result in the conversion

of up to 55 acres of land from agricultural use, because water and gas pipelines would either be constructed in or adjacent to road rights-of-way where agricultural uses are absent, or would be re-contoured to allow agricultural uses after installation.

8.9.1.6 Soil Loss and Erosion

The water erosion hazard designations for soils in the project area are listed in Tables 8.9-1A and 8.9-1B. Because all the erosion hazards are indicated as none, slight, or moderate, standard best management practices (BMPs) will be sufficient to control water erosion of soils from the sites under construction. Because most of the soil map units in the project area are level or nearly so, the ability to manage soil erosion risks are simplified.

The revegetation potential (Tables 8.9-1A and 8.9-1B) was based on the soil survey interpretation of the suitability of the soil to produce wild herbaceous plants. The revegetation potential of most of the affected soils is considered to be from fair to very good. This indicates that there should be few limitations to re-establishing vegetation for soil stabilization once construction activities have been completed. The soil mapping units with limitations for revegetation include those with drainage limitations (somewhat poorly-, poorly-, and very poorly-drained) such as Marcuse clay (Mb), Pescadero clay (Pd), Pescadero clay loam (211), Solano fine sandy loam (Sf), and Solano loam (Sh).

The overall potential for soil loss from water erosion is considered slight and the construction sites should not have significant limitations for revegetation. Although the potential for wind erosion is not defined in Tables 8.9-1A and 8.9-B, most of the soil surface textures are very fine (e.g., clay, clay loam, silty clay). Soils with these textures are cohesive and not likely to be at risk for wind erosion. Some soil units have coarser surface materials (e.g., loam, sandy loam, or fine sandy loams) that could be at slight to moderate risk for wind erosion. Preventive use of BMPs during construction and revegetation after construction is complete would be sufficient to avoid significant soil erosion as a result of the project.

8.9.1.7 Other Significant Soil Characteristics

Soil layers containing clay have a potential for shrinkage and swelling that can be a significant engineering consideration for constructed linear features. The soil survey indicates that many of the soil layers containing clay within the project area have a moderate to high potential for shrink and swell. High shrink-swell potential is reported for clay layers in the majority of soil units in the project area as follows: Altamont clay (Aa), Pescadero clay (Pd), Pescadero clay loam (211), Rincon loam (Rc), Rincon clay loam (Rd), San Ysidro loam (Sa, Sc), Solano fine sandy loam (Sf), Brentwood clay loam (Bb), Marcuse clay (Mb), Solano loam (Sh), Stomar clay loam (252, 253), and Willows clay (274). Problems that could be caused by shrink-swell need to be anticipated prior to construction. The material excavated in these soils may not be suitable for backfilling where subsequent soil movements could adversely affect constructed linear features.

8.9.2 Environmental Effects

The following subsections describe the potential environmental effects on agricultural production and soils during the construction and operation phases of the project.

8.9.2.1 Construction

Potential construction effects on soil resources can include increased erosion, compaction, loss of soil productivity, and disturbance of saturated soils. Soil erosion results in the loss of topsoil and can increase the sediment load in surface waters downstream of the construction site. The magnitude, extent, and duration of this construction-related impact would depend on several factors, including the erodibility of the soil (discussed above), the proximity of the construction to receiving water, and the method, duration, and time of year of construction.

Construction of the project, including the evaporation ponds, the construction parking and laydown area, and access road would result in soil compaction and the loss of soil productivity on some portions of the site from the construction of foundations and pavement. Soil erosion would be controlled in accordance with an approved Erosion Control Plan. Watering loose surfaces during construction would minimize soil loss from dust. Following deep excavation for linear corridors, soil materials would be stockpiled and replaced in excavated areas so that loss of the original stratigraphy is minimized. Some of the soils could have seasonally high water tables. In these areas, construction would be scheduled to minimize encounters with groundwater. Topsoil removed from the site in preparation for foundation construction would be stockpiled and covered; the topsoil may be available for sale for landscaping use or used to enhance the surface characteristics of onsite areas for revegetation. After construction, any areas that are not developed would be restored for landscaping or agricultural use.

Once constructed, the linear facilities would have no significant effect on surficial soils onsite or offsite. However, during construction, standard erosion and dust control methods would be implemented to reduce siltation in storm drains and waterways. Use of these methods would reduce losses of soil to wind and water erosion to a less than significant level.

The site, evaporation ponds, construction parking and laydown area, and some linears would pass through areas currently used for agriculture. Any areas not required for project operations would be restored to pre-construction conditions. Therefore, the project construction would have a less than significant impact on agriculture.

Construction of the project site would remove up to 55 acres of land currently classified as prime agricultural land from the resources of Alameda County. The project would also preserve agricultural uses on the remaining 119 acres. Alameda County has 10,500 acres of prime, unique, and agricultural lands of state importance. Loss of less than 1 percent for this use is not considered to be individually significant.

8.9.2.2 Operation

Project operation would not result in impacts to the soil from erosion or compaction. Routine vehicle traffic during project operation would be limited to existing roads, most of which are paved, and standard operational activities would not involve the disruption of soil. When linear facilities need to be inspected or maintained, vehicle traffic near cultivated areas would be minimized and slow. Impacts to soil from project operations would be less than significant.

8.9.2.3 The Effects of Generating Facility Emissions on Soil-Vegetation Systems

There is a concern in some areas that emissions from the generating facility, principally NO_X from the combustors or drift from the cooling towers, would have an adverse effect on soil-vegetation systems in the project vicinity. This is principally a concern where environments that are highly sensitive to nutrients or salts, such as serpentine habitats, are downwind of the project.

In this case, the dominant land use downwind of the project is agriculture. The addition of small amounts of nitrogen to agricultural areas would be insignificant within the context of fertilizers, herbicides, and pesticides typically used.

8.9.2.4 Cumulative Effects

The project would result in no more than 55 acres of agricultural land onsite being converted to industrial uses. While not individually significant, the project, when considered in conjunction with regional housing and industrial development, would contribute to the cumulative losses of agricultural soil resources in the region. Agricultural soil uses remain prevalent in eastern Alameda and western San Joaquin County and the conversion of up to an additional 55 acres is considered to be less than significant.

8.9.3 Mitigation Measures

Construction and operation of this project would result in conversion of up to 55 acres designated as prime farmland. The impact of this project on the regional availability of agricultural land would not be significant and requires no mitigation.

Erosion control measures would be required during construction to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation that destroys soil productivity and soil capacity. Temporary erosion control measures may be installed before construction begins and would be removed from the site after the completion of construction.

Landowners would be notified of activities adjacent to their properties. Vehicles would be driven only on areas designed to support them and with the express permission of the landowners. Vehicle traffic would be minimized to avoid undue soil compaction. Vehicle speeds would be kept low enough to avoid significant dust generation. Significant offsite migration of sediment would be prevented by measures described in the following sections.

8.9.3.1 Temporary Erosion Control Measures

Temporary erosion control measures would be implemented before and during construction. These measures typically include revegetation, slope stabilizers, dust suppression berms, ditches, and sediment barriers. Vegetation is the most efficient form of erosion control because it keeps the soil in place and maintains the landscape. Vegetation reduces erosion by absorbing raindrop impact energy and holding soil in place with fibrous roots. It also reduces runoff volume by increasing infiltration into the soil. Disturbed areas would be revegetated with rapidly growing groundcover as soon as possible after construction and vehicle traffic would be kept out of revegetated areas. If required, revegetation of the area disturbed by construction of the linear facilities would be accomplished using locally prevalent plant species. When lines are installed beneath existing road or railroad rights-of-way,

revegetation may not be consistent with the vegetation management goals of the right-of-way, and would not be implemented.

During construction of the project and the related linear facilities, dust erosion control measures would be implemented to minimize the wind-blown erosion of soil from the site. Water of a quality equal to or better than either existing surface runoff or irrigation water would be sprayed on the soil in construction areas to control dust and during revegetation.

Sediment barriers, such as straw bales or silt fences, slow runoff and trap sediment. Sediment barriers are generally placed below disturbed areas, at the base of exposed slopes, and along streets and property lines below the disturbed area. Sediment barriers are often placed around sensitive areas, such as wetlands, creeks, or storm drains, to prevent contamination by sediment-laden water. However, they should be placed up-slope when slope lengths are long enough to cause overloading of measures at the foot of the slope. Because the site is nearly level, it is not considered necessary to place barriers around the property boundary, but some barriers would be placed in locations where offsite drainage could occur to prevent sediment from leaving the site. Barriers and other sedimentation control measures would be used to prevent runoff into the irrigation ditch east of the site. If used, straw bales would be properly installed (staked and keyed), then removed or used as mulch after construction. Runoff retention basins, drainage diversions, and other large-scale sediment traps are not necessary because of the level topography and surrounding paved areas. Any soil stockpiles would be stabilized and covered if left onsite for long periods of time. These methods can be employed for construction of the waterline and most of the natural gasline.

8.9.3.2 Permanent Erosion Control Measures

Permanent erosion control measures include drainage and infiltration systems, slope stabilization, and long-term revegetation. Revegetation would follow from planting for short-term erosion control because seed mixes would contain annuals that establish ground cover quickly, perennials would be planted, and annuals would be reseeded for long-term vegetation. Significant landscaping to the north and south of the plant and along the access road is planned.

8.9.4 Applicable Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to agriculture and soils are discussed below and summarized in Table 8.9-2.

8.9.4.1 Federal

The Clean Water Act (CWA) authorizes the USEPA to regulate discharges of wastewater and stormwater into surface waters by issuing National Pollutant Discharge Elimination System (NPDES) permits setting pretreatment standards. The Regional Water Quality Control Boards (RWQCB) implement these permits at the state level, but the USEPA may retain jurisdiction at its discretion. The CWA's primary effect on the project is with respect to the control of soil erosion during construction, including the preparation and execution of site-specific erosion control plans and measures for the construction of each project element that would entail the physical disturbance of surface soil.

TABLE 8.9-2
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Agriculture and Soils

LORS	Applicability	AFC Conformance Section
Federal:		
CWA	Controls erosion of soil and disruption or displacement of surface soil	Section 8.9.3 and sections pertaining to stormwater management
California:		
CEQA	Assessment of impact on prime agricultural land	Section 8.9.3
Porter-Cologne Water Quality Control Act of 1972	Controls erosion of soil and disruption or displacement of surface soil	Section 8.9.3 and sections pertaining to stormwater management
Local:		
Alameda County: Grading Ordinance	Grading and trenching Soil conservation	Section 8.9.3 and sections pertaining to stormwater management
Contra Costa County: Grading Ordinance	Grading and trenching Soil conservation	Section 8.9.3 and sections pertaining to stormwater management
San Joaquin County: Grading Ordinance	Soil conservation Excavation and grading	Section 8.9.3 and sections pertaining to stormwater management

8.9.4.2 State

The RWQCB, which implements the Porter-Cologne Water Quality Control Act that controls surface water discharge, may become involved if soil erosion threatens water quality. CEQA requires that project impacts to state prime agricultural lands be assessed.

8.9.4.3 Local

Ordinances for land grading and stormwater pollution control have been established by Alameda, Contra Costa, and San Joaquin counties. These ordinances establish permitting requirements and exemptions for grading land and activities that can cause the discharge of pollutants into stormwater systems or watercourses. The grading ordinances specify the erosion and sediment control plan requirements for minimizing soil erosion and water pollution associated with land grading and heavy equipment operation. The Alameda County General Plan for the project area is the East County Area Plan (ECAP). Policies 75 and 76 in the ECAP address potential losses of agricultural lands as follows:

> **"Policy 75:** The County shall conserve prime soils (Class I and Class II, as defined by the USDA Soil Conservation Service Land Capability Classification) and Farmland of Statewide Importance and Unique Farmland (as defined by the California Department of Conservation Farmland Mapping and Monitoring Program) outside the Urban Growth Boundary.
>
> **Policy 76:** The County shall preserve the Mountain House area for intensive agricultural use. "Intensive agricultural use" is defined as high yield agricultural production including vineyards, orchards, and row crops as distinguished from low-intensity agriculture such as cattle and horse grazing."

While the project would remove up to 55 acres of prime agricultural lands, it would also preserve up to 119 acres for agricultural use. The individual losses to agriculture are estimated at less than 1 percent of available prime, unique, and lands of statewide importance, according to CDC.

8.9.5 Involved Agencies and Agency Contacts

Numerous agencies are involved with farmland protection and the control of soil erosion. These include the NRCS, the CDC, the state and regional water quality control boards, and other pollution control agencies. The agencies and their contacts are shown in Table 8.9-3.

TABLE 8.9-3
Agency Contacts for EAEC Agriculture and Soils

Item	Agency	Contact	Title	Telephone
Grading and trenching	Alameda County Grading Department	Gary Moore	Grading Supervisor	510/670-5402
Grading Permit	San Joaquin County Community Development	Rick Coates	Deputy Director	209/468-2097
Grading and trenching	Contra Costa County Public Works	Bob Hendry	Engineer	925/335-1375
Prime farmland mapping	California Department of Conservation	David Patch	Associate Environmental Planner	916/324-0860
Soil erosion	RWQCB	Leo Sarmiento	Water Quality Engineer	916/255-3049

8.9.6 Permits Required and Permit Schedule

A construction permit would be obtained before construction begins. Alameda County may require an excavation and grading permit before construction at the site. Other permits that may be required are an NPDES permit and a stormwater permit. These permits are discussed in Section 8.14, Water Resources.

8.9.7 References

California Department of Conservation (CDC). 1998 Farmland Mapping and Monitoring Program Maps for Alameda, Contra Costa, and San Joaquin Counties. Division of Land Resource Protection, Sacramento.

National Resource Conservation Service (NRCS)(formerly the Soil Conservation Service [SCS] of the U.S. Department of Agriculture).

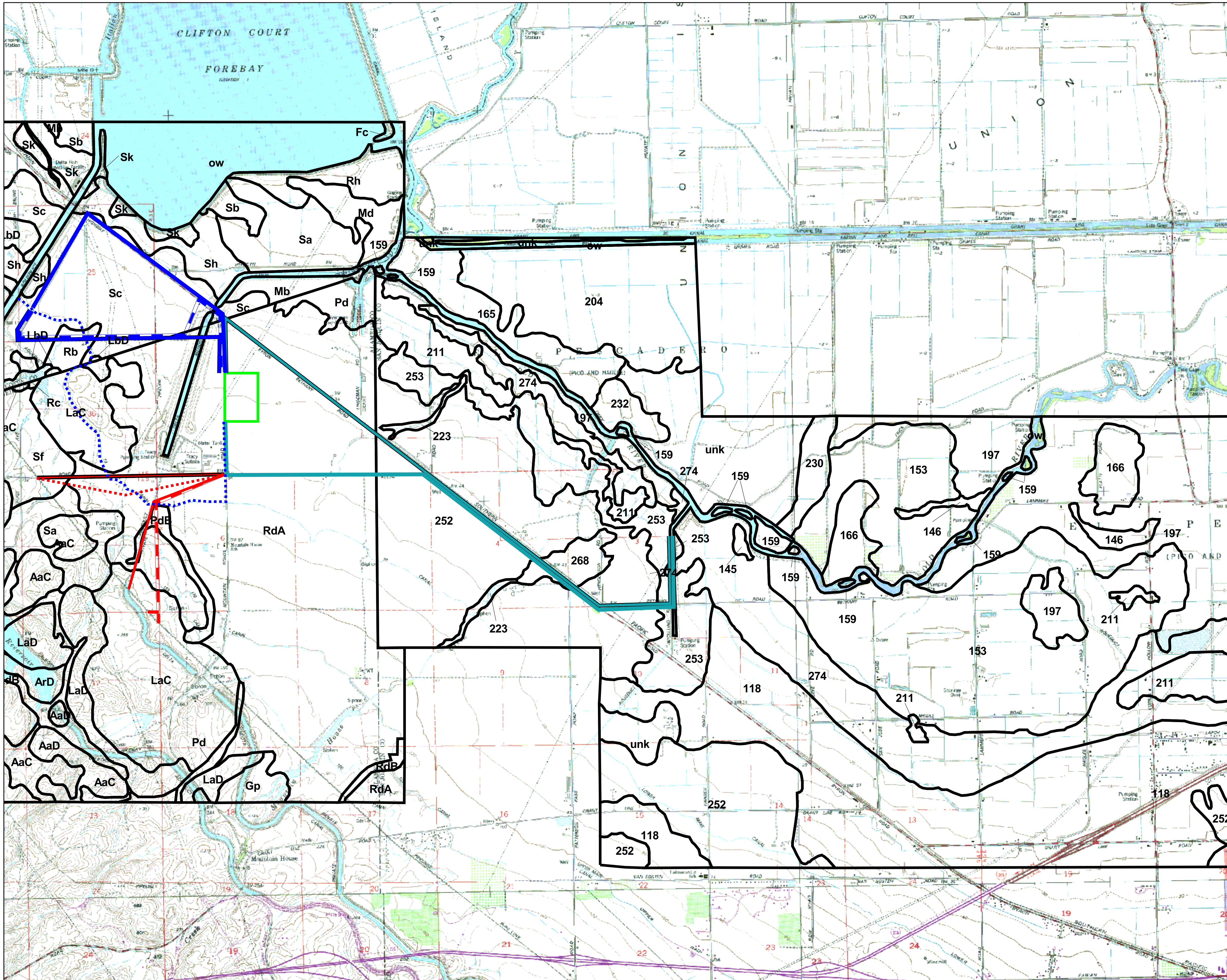
NRCS. 1966. Soil Survey of Alameda Area, California.

NRCS. 1977. Soil Survey of Contra Costa County, California. September.

NRCS. 1981. Soil Survey of Alameda County, California – Western Part. March.

NRCS. 1992. Soil Survey of San Joaquin County, California. October.

NRCS. 2000. Official Series Descriptions web page at http:// www.statlab.iastate.edu/cgi-bin/osd.



LEGEND

ALAMEDA COUNTY

AaC ALTAMONT CLAY
Fc FLUVAQUENTS
Gp GRAVEL PIT
La LINNE CLAY LOAM
Md MERRITT LOAM, NEARLY LEVEL
Pd PIPER SAND, 0-2% SLOPES
Rb RINCON CLAY LOAM
Rc RINCON LOAM
Rd RINCON CLAY LOAM
RdA RINCON CLAY LOAM, 0-3% SLOPES
RdB RINCON CLAY LOAM, 3-7% SLOPES
Rh RIVERWASH
Sa SAN YSIDRO LOAM
Sb SACRAMENTO CLAY, ALKALI
Sf SOLANO FINE SANDY LOAM
Sk SOLANO LOAM, STRONGLY ALKALI

CONTRA COSTA COUNTY

Bb BRENTWOOD CLAY LOAM
Lb LINNE CLAY LOAM
Mb MARCUSE CLAY
Sa SACRAMENTO CLAY
Sc SAN YSIDRO LAOM
Sh SOLANO LOAM

LEGEND

SAN JOAQUIN COUNTY

118 CAPAY CLAY
145 DELLO LOAMY SAND, DRAINED 0-2% SLOPES
146 DELLO LOAMY SAND, PARTIALLY DRAINED 0-2% SLOPES
153 EGBERT SILTY CLAY LOAM
155 GRANGEVILLE FINE SANDY LOAM
159 FLUVAQUENTS 0-2% SLOPES, FREQUENTLY FLOODED
165 GONZAGA-HONKER-FRANCISCAN COMPLEX, 50-75% SLOPES
166 GRANGEVILLE FINE SANDY LOAM, PARTIALLY DRAINED, 0-2% SLOPES
197 MERRITT SILTY CLAY LOAM PARTIALLY DRAINED
204 PELTIER MUCKY CLAY LOAM, PARTIALLY DRAINED 0-2% SLOPES
211 PESCADERO CLAY LOAM PARTIALLY DRAINED
223 REIFF LOAM
230 RYDE CLAY LOAM, PARTIALLY DRAINED, 0-2% SLOPES
232 RYDE CLAY LOAM, SANDY SUBSTRATUM, PARTIALLY DRAINED, 0-2% SLOPES
252 STOMAR CLAY LOAM
253 STOMAR CLAY LOAM
268 VERNALIS CLAY LOAM
274 WILLOWS CLAY PARTIALLY DRAINED

PROJECT SITE

N

4000 0 4000 Feet

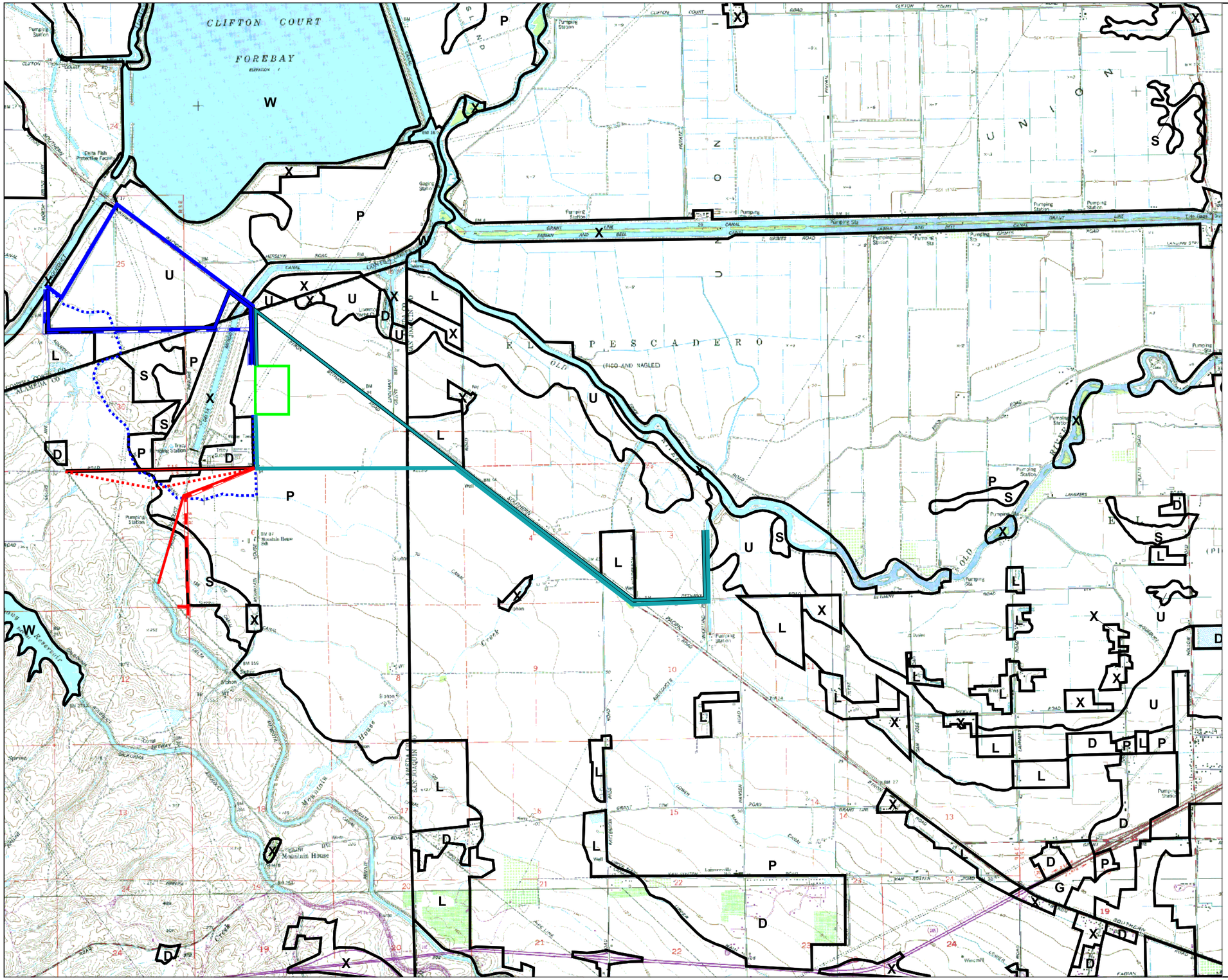
SCALE IS APPROXIMATE

SOURCE: NRCS, 1966; 1977, 1981, 1992, 2000

FIGURE 8.9-1
PROJECT AREA SOIL MAP

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL



LEGEND

D URBAN AND BUILT UP LAND

G GRAZING LAND

L FARM LAND OF LOW IMPORTANCE

P PRIME FARMLAND

S FARM LAND OF SIGNIFICANT IMPORTANCE

U UNIQUE FARMLAND

W WATER

X OTHER LAND

PROJECT SITE

GAS
- 2A PREFERRED
- 2C
- 2D
- 2E

WATER
- 3A
- 3B
- 3D PREFERRED
- 3E

RECLAIMED WATER
- 4A
- 4B

N

2000 0 2000 Feet

SCALE IS APPROXIMATE

FIGURE 8.9-2
PROJECT AREA AGRICULTURE

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL